



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
OREGON OPERATIONS OFFICE
811 S.W. 6th Avenue
Portland, Oregon 97204

November 6, 2003

Mr. Jim McKenna
Port of Portland & Co-Chairman, Lower Willamette Group
121 NW Everett
Portland, Oregon 07209

Mr. Robert Wyatt
Northwest Natural & Co-Chairman, Lower Willamette Group
220 Northwest Second Avenue
Portland, Oregon 97209

Re: EPA Comments on LWG Field Sampling Plan
EPA Alternate Field Sampling Plan



Dear Mr. McKenna and Mr. Wyatt:

We have completed our review of the Draft Portland Harbor RI/FS Round 2A Field Sampling Plan (Round 2A FSP), dated April 17, 2003. We also have reviewed the Technical Memorandum: Benthic Analysis Approach for the Portland Harbor Superfund Site (Benthic Approach Tech Memo) dated May 20, 2003. This letter provides EPA's response and comments on the Round 2A FSP and Benthic Approach Tech Memo.

As discussed in several meetings, EPA has determined that the sediment sampling proposed in the Respondent's Round 2A FSP is inadequate and a significant increase in the level of effort is needed in the next round of sediment sampling. Likewise, the benthic toxicity sampling proposed by the Respondents requires an increased level of effort. Although the benthic sampling approach proposed by the Respondents may have some utility in the RI process, we believe that significantly more benthic sampling with background and reference station comparisons are appropriate at least in an initial sampling round to better establish a baseline of information for toxicity comparisons before a predictive analysis is used. More detailed comments on the Round 2A FSP and Benthic Approach Tech Memo are attached to this letter. As you are aware also, EPA and its partners have prepared an alternate field sampling plan (EPA's Round 2 Field Sampling Plan, copy attached) in response to the Respondents' Round 2A FSP.

In accordance with the AOC, EPA disapproves the Round 2A FSP and the Draft Benthic Approach Tech Memo and directs Respondents to prepare and submit a Round 2 Field Sampling Plan that addresses the attached comments and incorporates the data collection described in EPA's Round 2 FSP. The revised FSP is due December 22, 2003.



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The Respondents' sampling plan for the RI/FS is comprised of three rounds of sampling. Round 1 was the fish tissue, and co-located sediment chemistry and beach chemistry sampling conducted in 2002. Round 2 is proposed to obtain the majority of sediment chemistry and benthic sampling for characterization of nature and extent and risk assessments. Round 3 was proposed for filling data gaps, if any, for the RI and FS.

Respondents' Round 2A FSP identifies 95 stations for surface sediment sampling in Round 2A. Of these 95 stations, 68 stations would be analyzed for sediment chemistry and bioassays, and 27 would be analyzed for sediment chemistry only. As proposed, additional surface sediment samples would be gathered to fill data gaps in Round 2B and possibly Round 3. Subsurface sediment chemistry would be evaluated as a part of Round 2B at a limited number of stations that meet criteria proposed by the Respondents in the draft RI/FS Work Plan.

EPA has determined that the Respondents' proposed sampling for Round 2A will not provide the sediment chemistry sampling needed to characterize contaminant distribution and potential source effects to the river. As a result, it will not provide the basis for a meaningful evaluation of: (1) contaminants of concern and the range of contaminant concentrations; (2) where all areas of contamination are located; (3) a reasonable approximation of the areal extent of the contamination; and (4) contaminant distribution at surface and at depth. EPA feels strongly that with such limited data after Round 2A, few if any decisions or trends could be determined, thus, a "data gaps analysis" for Round 2B would be inadequate and inconclusive. Additionally, the limited data generated by Round 2A would result in an overly biased Round 2B sampling proposal and most likely would require a large sampling effort that would needlessly delay the RI/FS process. Given all parties' stated goal of a fast track RI/FS, Round 2 should be designed to provide the majority of the data needed to complete the RI and risk assessments. However, the current Round 2A proposal and criteria for Round 2B falls far short of meeting that objective.

EPA and its partners have developed an alternative field sampling plan for sediment chemistry that is designed to meet the site characterization objectives of the RI and address significant data gaps within Portland Harbor. EPA and its partners have taken this time and effort due to the deficiencies in the Respondents' submittal and to expedite a quicker turnaround of a revised FSP that EPA can approve. EPA's Round 2 Field Sampling Plan (EPA Round 2 FSP) and supporting information are attached to this letter. EPA and its partners believe that this sampling program is more likely to achieve the goal of completing the RI/FS by 2006 because it will generate more data to better inform whether and what data gaps may remain and should reduce the amount of data that will need to be collected in future sampling events. Moreover, EPA's Round 2 FSP will result in earlier identification of the areas of the site presenting potentially acceptable and unacceptable risks. Further, the data from this alternative sampling plan can be used to more definitively identify the potential early action areas, and the location and extent of Sediment Management Areas for evaluation in the FS, or rule out areas where remedial action will likely not be needed.

As stated above, the Respondents revised Round 2 Field Sampling Plan that incorporates EPA's Round 2 FSP is due on December 22, 2003. We are willing to meet with you to discuss EPA's Plan and provide guidance to assist the Respondents with preparation of the revised Field

Sampling Plan.

Please note that the EPA's Plan is directed at data collection for sediment chemistry and benthic toxicity at this time. EPA intends to provide further direction to the Respondents on surface water sampling in separate correspondence in the near future.

If you have any questions, please call Chip Humphrey at (503) 326-2678 or Tara Martich at (206) 553-0039. All legal inquiries should be directed to Lori Cora at (206) 553-1115.

Sincerely,



Chip Humphrey
Tara Martich
Remedial Project Managers

Enclosures:

EPA Review Comments (LWG Round 2A FSP)
EPA Review Comments (LWG Benthic Tech Memo)
Sampling Rationale for EPA's Round 2 FSP
EPA Sampling Plan Maps and Tables

cc: John Crellin, ATSDR
Helen Hillman, NOAA
Ted Buerger, US Fish and Wildlife Service
Preston Sleeper, Department of Interior
Jim Anderson, DEQ
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Rick Eichstaedt, Nez Perce Tribe
Paul Ward and Tom Zeilman, Confederated Tribes of Yakama Nation
Valerie Lee, Environment International
Betsy Striplin, Striplin Environmental Associates

EPA Review Comments

Portland Harbor RI/FS Round 2A Field Sampling Plan

General Comments

- 1) Proposed Work is Insufficient to Meet Project Goals - The proposed effort for sediment sampling and surface water sampling is insufficient to meet the project goals of identifying and characterizing the sources, nature, and extent of contamination, and supporting the human health and ecological risk assessments. EPA and its partners have developed a sediment sampling plan for Round 2 to meet these project goals that is attached.
- 2) Scope of Round 2- Round 2 should provide information to:
 - Identify direct and indirect continuing sources of significant contamination to sediments;
 - Assess what sources can be controlled by early actions;
 - Define the nature and extent of contamination in all media (sediment, groundwater, surface water, tissue, etc);
 - Update the conceptual site model to address temporal, physical, and chemical changes and assess if the contaminants that are currently available to receptors are likely to change in the future under various scenarios.

The LWG places too much emphasis on the risk assessment process in Rounds 1 and 2, and not enough emphasis on defining the sources, nature, and extent of contamination, and obtaining the necessary information and data to develop a comprehensive site conceptual model (e.g., understanding of contaminant fate and transport in the system). It should be recognized that the RI cannot be complete until sources have been identified and characterized, and appropriate data collected to determine if they are or have contributed to the contamination in Portland Harbor.

- 3) Sample Density- The FSP states *“One of the objectives of Round 2A is to sample what are considered the worst-case areas to establish if unacceptable risks exist.”* The proposed sampling density and sample placement is not sufficient to meet this objective. A single sample adjacent to potential sources is unlikely to be “worst case” or representative of overall contamination at the site due to the complex, dynamic environment and limited knowledge of potential source areas. A much higher sampling density is needed adjacent to potential sources and in known in-water source areas. Furthermore, a higher sample density is needed to determine if there are significant undetected sources of contamination in the river.

- 4) Source Identification - While the LWG has presented substantial information regarding potential current and historical sources of contamination, very little sampling is proposed to identify new sources. The LWG relies almost exclusively on the existing sediment data for defining sources. The proposed approach will not be effective in identifying new sources, expanding the initial study area (ISA); or identifying potential in-water sources or hotspots. Potential known and historical contaminant sources should be identified and sediments in the vicinity of these potential sources sampled (e.g., over water facilities; outfalls).

- 5) Total Petroleum Hydrocarbons - The work plan states that total petroleum hydrocarbons (TPH) are a chemical of interest for many potential source areas. However, TPH is not included as a standard sediment analyte. TPH is defined as a hazardous substance in Oregon and should be included in the analytical suite. For example, assuming that there is no risk to benthos in the absence of polynuclear aromatic hydrocarbons (PAHs) or benzene, toluene, ethylbenzene, and xylene (BTEX) may not be true, especially with other petroleum hydrocarbon fractions are high.
- 6) Phasing- The FSP states that the Round 2A data will be submitted within 120 days after the Round 2A data collection, analysis, and validation effort is completed. What determines when analysis is completed? Does this refer to issuing of the final laboratory report or interpretation of the data's meaning?
- 7) Benthic Approach- The technical basis for the benthic approach proposed for Portland Harbor in the work plan, and subsequently the FSP, is incomplete. The benthic approach is described in a separate Technical Memorandum, dated May 20, 2003. Additional EPA comments on the proposed benthic approach are provided in the separate attachment (see Benthic Approach comments).
- 8) Bioassay Testing: Testing Procedure and Analysis- Generic protocols are provided on proposed testing using the freshwater amphipod *Hyaella azteca*, and the freshwater midge, *Chironomus tentans*. However, details are missing that outline proposed analysis on the bioassay data including whether toxic sediments will be identified through comparisons with test controls or by using reference sediments, how each treatment is compared to the control or reference sediment (statistical analysis), and what level will constitute a hit or no-hit.
- 9) Ecological Risk Assessment - Characterization of receptor habitat to support the risk assessment needs to be completed. Designations of ecological habitat for shorebirds and amphibians were reviewed during a Portland Harbor site visit with members of the government team. Habitat was added where appropriate, and is being provided to the LWG in map form.
- 10) Use of Round 1 Data- There are several references in the Round 2A FSP to the results of Round 1 data. For example, on page 24, 1st paragraph it is stated that "a Round 1 sample in the same area was found to contain low to moderate metals and PAHs...". Since Round 1 data were not presented in the work plan or FSP, but were used in part to make decisions on sample placement, this information should be made available before the FSP is finalized.
- 11) Spatial Comment- The lack of specific assessment endpoints in the RI Work Plan makes it difficult to review the FSP in order to determine if the characterization of habitat for receptors of concern is met. This may result in a disconnect between expectations and objectives of the ecological risk assessment between the LWG and the government/trustee groups. The assessment endpoints should be clearly stated in the programmatic work plan such that the FSP can be reviewed appropriately to ensure the proposed sampling meets those goals. For example, maps should be provided that include all potential habitat used by receptors of concern throughout Portland Harbor. Habitat should be mapped for each receptor including size and quality information, and local populations should be defined considering home range. Samples

placed to characterize this habitat should be clearly presented.

Specific Comments

Page 1 - Sentences two and three of the first paragraph should be deleted. They are legal conclusions and not technical statements relevant to the technical document.

Section 1.1.2, p. 4 - Under “Fish and Shellfish Tissue and Sediment Chemistry” add the words “in aquatic organisms and” after “site-specific concentrations.”

Section 1.1.2, p. 4 - Evaluation of Groundwater at Seeps - It is unclear how groundwater will be evaluated at seeps and related to the aquatic environment (pore water, surface water, and sediments). Evaluation of impacts may include pore water bioassay testing. Surface water may also need to be evaluated (in addition to sediment and pore water) where seeps exist.

Section 1.1.3, Page 5 – The objective of Round 2 sampling is “to gather the majority of the remaining data for the RI...” We disagree that Round 2A data should only have surface sediment chemistry “to characterize contaminant distribution.” Round 2A data should also include subsurface chemistry to characterize contaminant distribution.

Section 1.1.3, p. 5 - Additional surface samples and subsurface samples are needed to characterize contaminant distribution and potential source effects to the river. An additional goal of the Round 2 sampling should be to characterize the nature and extent of in-river sources of sediment contamination. At the bottom of the page, additional beach samples likely are necessary along the residential properties on Sauvie island between river miles 2 and 3, and also adjacent to the Oregon Steel property. In addition, beach samples will be needed to evaluate shorebird habitat.

Section 1.1.3, pgs. 5 and 6 - Subsurface Sediment Samples - Although the LWG addresses this issue, for the sake of clarity.....subsurface sediment samples will be needed to identify potential sources of contamination and to delineate the vertical extent of contamination.

Sections 1.1.3 (p. 5) and 1.2.1 (p. 8) - Round 2 Work - Round 2 should also include the following objectives:

- evaluate potential source areas (i.e., sample offshore of DEQ-targeted upland sites to determine if current or historical sources have impacted sediment quality);
- delineate local areas of contamination (i.e., hot spots);
- define the horizontal and vertical extent of contamination;
- collect adequate data to understand contaminant fate and transport in the river system; and
- collect adequate data to fill data gaps identified as a result of hydrodynamic modeling efforts.

Section 1.1.3, p. 6, first paragraph after bullets - Source Effects - The term “source effects” should be defined.

Section 1.1.3, p. 6 - A limited qualitative survey cannot be used to adjust quantitative information on fish ingestion in the baseline human health risk assessment. Unless adequate, local quantitative information could be obtained from a well-planned and -executed study, national consumption rates should be used in lieu of local data.

Section 1.1.3, p. 6, Round 2B objectives, first bullet - How will Round 2B fill data gaps in surface sediment chemistry from Round 2A? The sampling density proposed for Round 2A is unlikely to generate adequate information on nature, extent and source effects. Also, based on the data turnaround from Round 1, it is unlikely that Round 2B could occur prior to summer of 2004.

Section 1.1.3, Page 6 – Subsurface sampling needs to have the following objective: subsurface sediment chemistry to characterize contaminant distribution and source effects to the river. The objective of subsurface sampling should not be qualified with “substantial historic releases are documented.” Subsurface sampling is part of source identification and should be conducted at the same time as Round 2A, not after.

Section 1.1.3, p. 6 - Round 2B Work, Groundwater - This bullet should be revised to include characterizing the nature and extent of groundwater discharges and to evaluate impacts on sediments due to contaminated groundwater discharges.

Section 1.1.3, p. 6 - The Round 2B objectives should include:

- identify the extent of subsurface contamination; and
- identify buried sources of contamination that cause surface sediment or water exceedances (e.g., buried source of contamination flushed by clean groundwater).

Section 1.1.3, p. 6 - Risk vs Impact - Evaluating the “impact” is mentioned several times in the bullets on page 6. It should be objective to evaluate the *risk* of chemicals of interest (COIs) discharging from upland areas to sediments, pore water and surface water.

Section 1.1.4, pgs. 6 and 7, Round 3 Work - Define Sediment Management Areas (SMAs) - The work plan and FSP should discuss what criteria will be used to define sediment management areas (e.g., risk, physical river system, contaminant, facility).

Sections 1.1.4 (p. 7) and 2.1.1 (pgs. 11 and 12), Round 3 Work- Adequate Data in Certain Areas - The FSP states additional data will be collected to fill “*substantial...uncertainties*.” It should be recognized that the sources, nature, and extent of contaminant must be fully defined during the RI/FS process. The FSP further states “*If considered individually, many of these locations along the ISA have been adequately characterized, or nearly so, for their respective sources and COPCs*”.

Section 1.2, Pages 7-8, General Comment – Excluding the collection of subsurface sediment samples from Round 2A would not fulfill the objective of filling data gaps relating to site characterization.

Sections 1.2.1 (pgs. 7 and 8) and 2.1.2 - Sources of Contamination - In a number of places in the FSP, the LWG states that the purpose or objective of the RI is to investigate the nature and extent of chemical distribution in the in-water portion of the site (i.e., the nature and extent of contamination). The LWG's RI Work Plan and FSP neglects to include a discussion regarding the identification and characterization of sources of contamination. EPA's 1988 RI/FS guidance describes the importance of identifying and characterizing the source of contamination.

It appears that the LWG's work plan and FSP assumes all the sources of contamination in Portland Harbor have been identified. Not all the sources of contamination have necessarily been identified in Portland Harbor. For instance, in Round 1, the LWG collected a grab sediment sample in RM 5-6 (Sample 05R040). The sample was collected in the channel portion of the river and not clearly associated with any upland or near-shore sediment contamination. The sample (05R040) was described as having "lots of oily sheen". The contamination may result from an over-water release, not associated with any upland or near-shore activities. The identification of contamination at location 05R040 is an example of how a more thorough search for sources of contamination is needed.

Knowledge regarding up-land activities, over-water activities, or historical use of a site should be considered in placing RI samples. The sampling approach proposed in Round 2 will not be adequately effective in identifying new sources of contamination, evaluating whether the ISA should be expanded to define the site, or identifying potential in-water hot spots of contamination.

Section 1.2.1, p. 8 - The first paragraph states that one reason for sampling sediments in nearshore areas is that these represent the most important exposures for human receptors; however, there is no plan to evaluate sediment chemistry for human exposures other than the beach samples collected in Round 1. Therefore, human exposure does not appear to be part of the rationale for sampling in nearshore areas.

Sections 1.2.1 and 2.0 - Site Characterization, Historical Data - Sampling locations should be selected based on an evaluation of all existing data (Category 1 and 2). If Category 2 data indicate the presence of contamination – additional sampling should be performed to obtain data evaluating potential sources, nature, and extent of contamination in that area. If the LWG proposes to utilize pre-1997 sediment data, then selected historical sampling stations must be reoccupied to demonstrate the historical data are representative of current conditions.

Section 1.2.1, pgs. 8 and 9 - Site Characterization, Surface Water - The proposed surface water sampling effort is limited and the rationale behind the surface water investigation is unclear. The rationale for the transect approach, transect location, proposed sampling depth, and sampling methodology should be provided. What specifically is the proposed investigation going to tell us? How will the data be used? Additional sample locations and possibly sampling periods (i.e., samples collected at different seasons) will be needed to develop a reasonable characterization of surface water conditions that is suitable for the risk assessments.

Section 1.2.2, p. 9 - Bioaccumulation via surface Water - In addition to assessing direct toxicity to aquatic organisms, assessing bioaccumulation of chemicals from surface water into organisms should also be considered.

Section 1.2.3. p. 9 - In addition to targeting quiescent areas adjacent to beaches used by swimmers, surface water should be samples adjacent to beaches used by transients as these individuals are likely to have the greatest exposure to surface water.

Section 2.0, Page 11, – The sample density shown in Figures 2-1 is too sparse to be able to meet the objective of characterizing contaminant distribution.

Section 2.1.1, Page 11 –We do not agree that all data proposed as Category 1 are usable in the site characterization portion of the remedial investigation. Some Category 1 data may not be representative of current site conditions.

Section 2.1.1 - Data Needs - More Comprehensive Sampling Approach - The sampling approach presented in the FSP is not sufficient to “gather the majority of remaining data” (LWG, 2003) or to achieve the LWG’s goal about completing the RI/FS by 2006. A much more comprehensive sampling approach is needed to achieve the RI objectives and to provide adequate data to complete the risk assessments and feasibility study.

Section 2.1.1, p. 12 - Early Actions and Source Control Activities - The FSP states “...to identify potential source areas. This information will be provided to EPA and DEQ for future source control activities.” The LWG is responsible for addressing in-water Early Actions under EPA oversight and identifying areas of in-water contamination that need to be considered for future source control activities. It is unclear what is intended by the referenced statement.

Section 2.1.1, p. 12 - Spatial Scale - Spatial scale is important in defining “spatial distributions of COPCs” relative to a risk assessment process. It is important that the spatial scale is defined and agreed such that the ability of the FSP to meet the objectives can be reviewed.

Section 2.1.1, p. 13, Habitat and Home Range of Ecological Receptors - It is stated that historical sediment stations were reviewed with “regard to spatial representation of shorebird habitat (exposed sediments), diving bird habitat (nearshore “bench” habitat”), and mink and raptor feeding habitat (open water in the ISA)”. The assessment endpoints in the work plan were not complete enough to review whether these sampling points meet the assessment endpoints and objectives of the risk assessment. Clear maps should be presented outlining the habitat and home range of each receptor such that this information can be reviewed and agreed upon prior to reviewing a FSP. Based on a site visit by the internal Eco Subgroup, the proposed sampling locations are inadequate to properly assess receptors of concern in Portland Harbor. For example, additional beach area characterization for the sediment probing sandpiper is not proposed. Characterization should extend up to the mean high water line.

Section 2.1.2, p. 14, Proximity to Sources - The sediment sampling approach is not sufficient to evaluate known, suspected historic and ongoing sources of contamination. The sampling

approach should at a minimum include source-specific samples to characterize the nature and extent of in-water contaminants. Sample locations should be selected based on site-specific sources and river dynamics in the vicinity of the source.

Section 2.1.2, p. 15 - The sediment sampling locations proposed in the FSP are inadequate to better understand the nature and extent of chemicals in previously uncharacterized areas. Despite the reported attempt to place samples closer together in areas with notable historic industrial operations, this distance is not close enough to reasonably determine potential source effects to the river.

Section 2.1.2, p. 15, Sediment Transport Areas - Selected sediment sample locations should be selected based the assumed or modeled river dynamics. Sediment cores should, in part, be selected in particular areas to evaluate model assumptions.

Section 2.1.3, Page 16, – Ninety-five sediment sampling locations will not be sufficient to characterize the site, even as an initial step.

Section 2.1.3, p. 17, Near-shore Sampling - It is stated that to “support a Round 2A objective of conducting a biased sampling program that will enable preliminary risk estimates to be based on worst-case scenarios, the majority of samples in Round 2A are located in nearshore areas”. This should be clarified. Nearshore areas are closer to the sources (upland facilities), but it is within the nearshore areas of the river that the majority of the receptors of ecological concern also live and forage. Therefore, these areas have the highest potential for complete exposure pathways. This may not be “worst case” at all, but simply more realistic.

Section 2.1.3, p. 17, Sampling at Tier 1 Sites - The concept of greater sampling density in nearshore areas off DEQ Tier 1 sites is good. However, the number of sampling locations proposed appears to be inadequate to meet the objectives of the RI.

Section 2.1.3, Page 18, Nearshore RM 2-3 – Five sediment sampling locations will not be sufficient to characterize River Mile 2 to 3. In addition, we disagree with the statement, “[a]dditional sampling along the shoreline of OSM is not necessary to meet the objectives of Round 2A.” Data have not been presented that proves the following statement: “[t]he existing data off the OSM outfalls are considered to be probable worst-case areas.” What is “probable” based on?

Section 2.1.3, p. 18, Nearshore of RM 2-3, Downstream of the ISA - An additional task for this segment of river as described above is the collection of beach sediment samples from residential properties that are along the river front. Although this area is somewhat erosional, the potential for regular contact with beach sediments by residents elevates the concern in this area. Additionally, because of potential beach use by residents, surface water samples should be collected adjacent to residential properties.???

Section 2.1.3, p. 18, Sediment Sampling at Oregon Steel Mills (OSM) - The FSP states “*OSM conducted extensive sampling adjacent to their outfall...s*” – The sediment sampling was

performed to determine if the outfalls were a source of contaminants to the river. The investigation was not designed to define the nature and extent of contamination. Additional characterization is needed to define the nature and extent of contamination at this facility.

Section 2.1.3, Page 19, Nearshore RM 3-4 – Twelve sediment sampling locations will not be sufficient to characterize River Mile 3 to 4, which includes the International Slip.

Section 2.1.3, Page 19, Table 2-3 and Figure 2-1 – Text and figure show that Sample #17 is to be located off the Georgia Pacific property and not Owens-Corning as indicated in the table. One sample that is located “immediately off one outfall and downriver of another” is not sufficient to characterize this area.

Section 2.1.3, Sample Placement - It is unclear whether decisions regarding the placement of bioassay samples was based on the comparison to sediment screening levels or on qualitative information. In some parts of the Round 2A FSP, sample placement is justified by statements such as “existing data suggest potentially elevated PAHs and metals” (page 20), while other statements are specific as to why they were selected including “this area has elevated metals concentrations that exceed PECs”. Please clarify.

Section 2.1.3, Page 20, Nearshore RM 3-4 – One sample (Sample #15) is not sufficient to characterize an area that stretches for over a quarter mile, even if “given the apparent lack of industrial activity at this site” which was not further described other than the above statement.

Section 2.1.3, Page 20, Nearshore RM 3-4 – One sample is not sufficient to fill the data gap at Time Oil “where existing data do not include all analytes of concern for the facility.” Locate more samples here.

Section 2.1.3, Page 20, Nearshore RM 3-4 – Three samples are not sufficient to characterize a slip (with differing operations on either side) which is approximately 2,000 feet long.” More samples need to be placed here.

Section 2.1.3, Page 20, Nearshore RM 3-4 – We disagree that one sample is sufficient to characterize approximately 2,000 feet of shoreline at Schnitzer Steel.

Section 2.1.3, Page 20, Nearshore RM 4-5 – Eleven sediment sampling locations will not be sufficient to characterize River Mile 4 to 5.

Section 2.1.3, Page 20, Nearshore RM 4-5 – Collecting two samples, one at the head and one at the mouth of Slip 1 (at Terminal 4) is not sufficient. There is still the lack of understanding for temporal changes within the river and slips, even if these locations are based on “historical data, to be the part of the slip with the highest chemical concentrations.”

Section 2.1.3, Page 21, Nearshore RM 4-5 – We disagree that more samples are not necessary between Stations 23 and 26. The concept that this area is “erosional and not well suited for

sampling” appears to be based on preliminary physical studies and the inappropriate use of these results will not sufficiently characterize the potential contamination.

Section 2.1.3, Page 21, Nearshore RM 4-5 – The LWG has not provided evidence that “there is a lack of sources” between Terminal 4, Slip 3 and RM 5. This stretch of river is approximately 2,000 feet and needs to be characterized.

Section 2.1.3, Page 21, Nearshore RM 4-5 – Four stations are not sufficient to characterize the nature and extent of contamination along the western side of the river between RM 4 and 5.

Section 2.1.3, Page 21, Nearshore RM 5-6 – According to the text, one station is proposed for the Terminal 4 Toyota Auto Storage Area; however, no stations were located on the figure or the table that indicates that there is such a sample location. One sample location is not sufficient to identify whether there exists any potential contamination along this operation, which is approximately 3,500 feet of riverfront. Part of the RI/FS is to identify potential overwater sources and sampling results from “off outfalls” is not sufficient. LWG has not presented sufficient data to state “it is highly unlikely that areas between these outfalls would have elevated concentrations given the lack of sources.”

Section 2.1.3, Pages 21-22, Nearshore RM 5-6 – One sample location is not sufficient for the Marcom facility and for properties upriver of the facility. LWG states that sampling results collected by the facility and the City should be available soon, but there are no assurances that their data will meet all the RI/FS quality objectives and analytes.

Section 2.1.3, Page 22, Nearshore RM 5-6 – The absence of nearshore sampling at the Mobil Oil Terminal is not acceptable. There is no discussion whether Category 1 data for all analytes are available. There is no discussion of any Category 2 data results in comparison to Category 1 data. In addition, four nearshore sample locations are not sufficient for the west bank of the river between River Miles 5 and 6. The statement that “[t]he shoreline near both Stations 38 and 39 is vegetated and lacks human-made structures that could be related to potential sources” appears conclusive prior to the presentation of historical information for the properties and collection of any samples. Please discuss the presence (or absence) of historic tank farms in this area.

Section 2.1.3, Page 22, Nearshore RM 5-6 – One sampling station (Station 40), one Category 1 data point (no discussion whether data includes all chemicals of interest and how it compares to Category 2 data) and one Round 1 sample for 2,000 feet plus of shoreline is not appropriate or acceptable. The same type of comment applies to reasoning for Station 42 and the absence of samples between Station 42 and River Mile 6. We disagree with the conclusion that “additional samples are not warranted.”

Section 2.1.3, Page 22, Nearshore RM 6-7 – Fourteen stations are not sufficient to characterize the nature and extent of contamination between RM 6 and 7. Three of these fourteen stations are located within or adjacent to McCormick & Baxter which is in the cleanup phase. The nature and extent of contamination is characterized for this site, and sampling density along the river should more closely match the amount of sampling for the McCormick & Baxter site, which

occupies approximately 2,000 feet of riverfront. Besides McCormick & Baxter, this river mile contains an outfall from Aventis (Rhone-Poulenc), Wacker Siltronic, Gasco and Willamette Cove.

Section 2.1.3, Pages 22-23, Table 2-3 and Figure 2-1 – Samples #55 and #56 appear to be within the proposed sediment cap, one of the remedies specified for the McCormick & Baxter Superfund site. These sample locations should be moved to areas that have less characterization data and are not in a cleanup process, which would be of a higher priority.

Section 2.1.3, p. 23, Contaminants of Potential Concern - The FSP should be revised to indicate the cyanide, benzene, and naphthalene are primary contaminants of potential concern for the upland investigation for the Gasco and Wacker sites. In addition, volatile organic compounds (VOCs) are of interest at the Wacker site. Contaminants of potential concern at Atofina include DDT, DDE, hexavalent chromium, VOCs, and perchlorate.

Section 2.1.3, p. 23, Investigation at Gasco - The FSP states "*Gasco is conducting extensive investigatory work in the vicinity of its facility*" and that "*With the addition of the Round 2A samples, there will be more than sufficient number of samples to characterize this section of the river.*" DEQ disagrees with these statements. The first statement is misleading Gasco (a.k.a., NW Natural) did expand its RI investigation onto the Wacker property about a year ago to define the nature and extent of contamination associated with its historical operations. However, Gasco has only performed limited in-water investigations; no in-water work has been conducted since the Spring of 2001.

Section 2.1.3, Page 23, Nearshore RM 6-7 – We disagree with the statement, "[a]dditional samples along this shoreline are not warranted to meet project objectives." Sampling is necessary in Willamette Cove.

Section 2.1.3, Page 23, Nearshore RM 6-7 – Discuss the "considerable existing data set for sediment chemistry along the west side of the river from RM 6 to 7." Please describe in detail the results of the chemicals of interest and the number of samples for each chemical.

Section 2.1.3, Page 23, Nearshore RM 6-7 – Describe in detail the "extensive investigatory work in the vicinity of its facility" being conducted by Gasco, including the sample locations and results.

Section 2.1.3, Page 23, Nearshore RM 6-7 – Two samples proposed for Round 2A will not provide the additional samples to have "more than sufficient number of samples to characterize this part of the river." Unless the data from Gasco's "extensive investigatory work" is produced and approved for use, two samples are not sufficient.

Section 2.1.3, Page 24, Nearshore RM 7-8 – Seven stations are not sufficient to characterize the nature and extent of contamination between RM 7 and 8.

Section 2.1.3, Page 24, Table 2-3 and Figure 2-1 – Sample #60 is within the McCormick &

Baxter Superfund site. This sample location should be moved to an area that has less characterization data, which would be of a higher priority.

Section 2.1.3, Page 24, Nearshore RM 7-8 – Two samples on the east side of the river for this river mile are not sufficient, one of which is at McCormick & Baxter. There are no sample locations proposed for the Triangle Park property or for the University of Portland bluff. There is no discussion whether Category 1 data for all analytes are available for these areas and no data presented that indicate the absence of any overwater sources. In addition, there is no discussion of any Category 2 data results in comparison to Category 1 data.

Section 2.1.3, Page 24, Table 2-3 and Figure 2-1 – Five samples on the west side of the river for this river mile are not sufficient. There is no discussion whether Category 1 data for all analytes are available in sufficient density to characterize the area. In addition, there is no discussion of any Category 2 data results in comparison to Category 1 data. This river mile has several sites of concern including ATOFINA, Willbridge Terminal and McCall Oil/Great Western Chemical. In addition, Sample #64 appears to be located off the McCall Oil property and not Willbridge Terminals as stated in the table.

Section 2.1.3, Page 25, Nearshore RM 8-9 – There is no discussion whether Category 1 data for all analytes are available in sufficient density to characterize the Cascade Shipyard and Swan Island Lagoon. In addition, there is no discussion of any Category 2 data results in comparison to Category 1 data. Without sufficient information, more sample locations would be needed to characterize this area.

Section 2.1.3, Page 25, Nearshore RM 8-9 – Seven samples for the main stem of the river for this river mile are not sufficient. There is no evidence given that allows for the statement “[a]dditional samples do not appear warranted.” There is no discussion whether Category 1 data for all analytes are available in sufficient density to characterize the area. In addition, there is no discussion of any Category 2 data results in comparison to Category 1 data. Three samples are not sufficient to characterize approximately 2,000 feet of shipyard property. Moreover, additional sample locations are necessary along another 2,000 feet of Swan Island waterfront to identify potential sources.

Section 2.1.3, Pages 25-26, Nearshore RM 8-9 – On the west side of the river, one sample off the Glacier Northwest property and one sample off the Lakeside Industries property is not sufficient. The absence of sampling at the Front Avenue properties, Shaver Transportation property and Equilon dock is not sufficient. Two samples in this river mile for the Gunderson property, which has released chlorinated solvents to the river, are not sufficient. There is no discussion whether Category 1 data for all analytes are available in sufficient density to characterize the area. In addition, there is no discussion of any Category 2 data results in comparison to Category 1 data.

Section 2.1.3, Page 26, Nearshore RM 9-10 – Potential sources, including any historical overwater sources upstream of the ISA should be sampled. Two samples will not suffice. This area should be gridded and sampled at a higher density. In addition, several samples are needed in the vicinity of several sites, some above RM 10, such as Goldendale Aluminum, the Union

Pacific Railroad Albina Yard, the outlet of Tanner Creek, Port of Portland's Terminals 1 and 2, Sulzer Bingham Pump, and Ashgrove Cement.

Section 2.1.3, Page 26, Navigational Channel Sampling – We disagree with the conclusionary statement, “much is known about the navigation channel’s transport regimes.” Two bathymetry surveys completed within a half-year may not be representative of the physical system of the river. This type of statement should not be made until more data are available.

Section 2.1.3, Page 27, General Channel Station Rationale – Round 2A sampling needs to have as its focus an identification of sources and the nature and extent of contamination. The focus of Round 2A cannot solely be “determining where unacceptable risks occur.” Delete or modify this statement.

Section 2.13, p. 27, Rationale for Evaluating General Channel Conditions - The FSP states “...it must be reemphasized that the overall Round 2A surface sampling program is focused on determining where unacceptable risks occur, and the nearshore sampling program is biased toward likely source areas as worst-case estimates of risk.” Too much emphasis is being placed on the risk assessment process, and not enough emphasis on defining the sources, nature, and extent of contamination, and understanding the contaminant fate and transport in the system. A single sample adjacent to potential sources is unlikely to be “worst case” or representative due to the complex, dynamic river environment and limited knowledge of potential source areas. A much higher sampling density is needed adjacent to potential upland sources and within in-water source areas. The sampling density and sample placement proposed in the FSP is not sufficient to complete the RI.

Section 2.1.3, Pages 27-30, General Channel Station Rationale – Channel sampling needs to occur at a higher sample density. In addition, there is no discussion whether Category 1 data for all analytes are available in sufficient density to characterize the area nor discussion of any Category 2 data results in comparison to Category 1 data.

Table 2-3 and Figure 2-1, Page 29 – Sample #43, which is described as a channel sample, is located more closely to Marine Finance. This sample location appears to be important due to the visual observation of “oily sediment during Round 1.” Therefore, additional channel sample locations will be necessary.

Section 2.1.5 and Table 2-3, Pages 29-30 – Butyltins need to be sampled near several other potential sources (with additional sample locations) such as near: ACF Industries, Schnitzer, Marcom, Marine Finance, Brix Maritime, Willamette Cove, Triangle Park, Portland Shipyard, Lakeside, Equilon (Shell and Texaco) and Gunderson.

Section 2.1.5 and Table 2-3, Pages 29-30 – VOCs need to be sampled near Premier Edible Oils, Northwest Pipe, Brix Maritime, Wacker, Rhone Poulenc and Willbridge.

Section 2.1.5 and Table 2-3, Pages 29-30 – Dioxins/PCBs and chlorinated herbicides/pesticides need to be included in some samples off site of Wacker to characterize the nature and extent of

contamination from the Aventis site.

Sections 2.1.5 (p. 30) and 4.6.1 (p. 47), Sediment Sample Analyses - The FSP should be revised to state that an Oregon registered geotechnical engineer or geologist will interpret geologic conditions and select appropriate samples for geotechnical testing.

Section 2.1.5, p. 30 Additional Analytes - Total petroleum hydrocarbons should be added to this section.

Section 2.2.1, Page 31 – It is difficult to delineate which surface waters to which swimmers are exposed; therefore, all samples, including those close to the sediments, may need to be considered in an evaluation of human health risk. A similar conclusion should be drawn in the case of aquatic organisms with respect to the ecological risk assessment.

Section 2.2, Page 31 – Surface water samples should be collected when sheens are observed when sediment samples are collected.

Sections 2.2.1 and 2.2.2, p. 31, and Round 2A QAPP Addendum, Water Column Chemistry for Ecological Risk Assessment - One of the objectives stated in the RI Work Plan was the use of a food web model in the preliminary risk evaluation (PRE) and baseline ecological risk assessment (BERA). This will require the collection of water chemistry appropriate for model parameterization, and should be included in Round 2 sampling. Sample number and placement should correspond with areas identified as amphibian habitat by this work plan or a site visit by the government team. In addition, general characterization of surface water for the river, including the main channel, is needed to assess water exposure for other ecological receptors.

Section 2.2.1, p. 31- For transient use, intentional ingestion of surface water should be added as a potentially complete exposure pathway.

Section 2.2, p. 31, Water Column Chemistry - The proposed surface water sampling program is insufficient to meet the objectives of the RI. The rationale for the transect approach, their location, the proposed sampling depth, and the sampling methodology should be provided. What specifically is the proposed investigation going to tell us and how will the data be used? The FSP or work plan should specifically discuss alternative sampling methodologies (e.g., high volume sampling; SPMDs) considered? Was the OSU semi-permeable membrane device (SPMD) data considered in developing the sampling approach (e.g., locations, depths, methods)? Additional transects should be included in the proposal.

One of the goals of the surface water effort should be to assess potential contaminant inputs into the river (e.g., stormwater outfalls, permitted process discharges, groundwater discharge; tributaries; upstream or adjacent nonpoint sources) on sediment and surface water quality.

Section 2.2, p. 31, Water Column Chemistry - The FSP states that surface water chemistry is needed in generalized areas of the ISA to develop an understanding of the chemicals present. We are concerned that the LWG's proposal to characterize surface water chemistry may only

characterize general conditions in the ISA, but will not necessarily characterize conditions in areas where surface water may be significantly contaminated (e.g., close to near-shore source areas, in areas of contaminated groundwater discharge, etc.). We are also concerned that these potential areas of localized surface water contamination (i.e., those areas where surface water may be significantly contaminated) may be diluted and masked by general ISA conditions.

The LWG partially addresses our preceding concern by proposing to collect surface water quality samples near recreational beaches (to address human exposure) and in quiescent areas (to address early life-stage amphibians). However, LWG's effort should, in addition to their FSP surface water quality sampling proposal, include collecting surface water quality samples in areas where surface water may be significantly contaminated.

Section 2.2.4, p. 33, Filtered Surface Water Samples for Metal Analyses - The FSP states that filtered surface water samples will be analyzed for metals. Given the suspected update (incidental ingestions and dermal contact), why should the surface water samples be filtered? Because ingestion is a risk, we do not think filtration is appropriate.

Section 3.3, Page 38 – LWG needs to coordinate the field sampling activities also with tribal representatives, particularly because of cultural resources.

Section 4.2, p. 41, Sediment Stations - It is stated that during the proposed sediment grab sampling, locations may be moved due to obstructions. Are there some areas where samples need to be taken, which may require the use of alternative equipment? In subsequent text on page 45, Section 4.6.1, it states, "all samples will be collected within 10-15 meters of the target sampling location".

Section 4.5.1, p. 44, Decontaminating the Grab Sampler - The FSP states that the grab sampler will be rinsed with site water between stations. If the sampler encounters visibly contaminated sediment, the sampler should be thoroughly decontaminated before sampling at a new station.

Section 4.5, Page 45 – The surface water decontamination procedures mentions soaking tubing overnight in nitric acid. Will tubing not be disposable?

Section 4.6.1, p. 46, Washing Fine-Grain Sediment Out of Sampler - The referenced text states that the retrieval rate for the power grab will be low enough to prevent disturbance of the sampled sediment surface. Will the power grab have any cover or other device to minimize loss of fine-grain material during retrieval?

Section 4.6.1, p. 46, Sediment Collection - It is stated that "once the sampler is brought on board, it will be placed on the sieving stand". In addition, a 6 μ m sieve is listed under "tools" in the sediment sampling checklist, in Appendix B. However, it is not clear from the FSP how and when sieving is proposed to be used. Sieving is not recommended because it can substantially change the physicochemical characteristics of the sediment sample (EPA, 2001). For example, wet sieving of sediment through fine mesh (<500 μ m openings) has been shown to result in decreased percent total organic carbon and decreased concentrations of polychlorinated biphenyls

(PCBs), which might have been associated with fine suspended organic matter lost during the sieving process. Sieving can also disrupt the natural chemical equilibrium by homogenizing or otherwise changing the biological activity within the sediment (EPA 2001).

Section 4.7, p. 50, Waste Disposal and Investigation Derived Waste (IDW) - Section 4.5.1 of the FSP states that the decontamination of sediment sampling equipment will include a rinse with methanol or ethanol. Appendix C (Surface Sediment Sampling SOP) states that a hexane rinse may be used to decontaminate sediment sampling equipment. Section 4.7 of the FSP states that phosphate-free, detergent-bearing, liquid IDW will be washed overboard or disposed into the sanitary sewer system. The FSP does not describe how the waste solvent rinse (and other decontamination waste fluids) will be disposed. It should be disposed of in the sanitary sewer.

Section 4.7, p. 50, Waste Disposal - Any oily or obviously contaminated investigation derived waste should be placed in appropriate containers, a waste determination made, and disposed of at an appropriate facility.

Section 5.1.1, page 55 – Total petroleum hydrocarbons need to be added to the analyte list.

Section 7.0, page 60 – The Round 2A Site Characterization Summary Report should also in its evaluation include integration of data with Round 1 data. Results should, at a minimum, be presented in both tabular and GIS format.

Section 7.0, p. 60, Reporting - The proposed reporting schedule should be based on completion of discrete events (e.g., field sampling, submittal of samples to laboratory; receipt of preliminary laboratory reports). What determines when “*sampling and analyses*” is completed? Does this refer to issuing of the final laboratory report or interpretation of the data’s meaning?

Tables 2-1 and 5-2, Volatile Organic Compound (VOC) Analysis in Surface Water - VOCs should be included in the list of surface water analytes.”

Table 5-1, Round 2A Sediment Analyses - Consideration should be given to analysis of sulfides, ammonia, pH profiles, and redox potential in selected samples.

Table 5-2, Round 2A Water Analyses - Consideration should be given to analysis of general water quality parameters including: magnesium, calcium, sodium, potassium, iron, bicarbonate, carbonate, nitrate, chloride, sulfate, phosphates, and ammonia in selected samples.

Appendix A – The Sample Depth Evaluation is based on the bathymetric changes observed between two surveys only and concludes that a one-foot depth interval is sufficient to be the standard representative surface sampling interval for the RI/FS. However discrete, shorter-term deepening or shallowing events that may have occurred within the observation period, and more importantly their magnitude, are not accounted for in these observations.

Appendix A, Section 2.0, p. 1, Water Level Datums - The work plan and/or the FSP should include a discussion of the common datums and water levels (e.g., ordinary high water, mean

high water) used in the Portland Harbor area.

Appendix A, Section 3.0, pgs. 2-4, Evaluation of Survey Elevation Difference - The evaluation of survey elevation difference maps should also discuss:

- If the observed changes fit the conceptual site model of the river;
- If the observed changes are consistent with known river velocities;
- What the period of bathymetric change is representative of (i.e., low water, <1 year flood event) [i.e., can the flow data (river stage and discharge measurements) during this period be compared to historical records to determine if this period is representative of low flow conditions or a <1 year flood event?]
- Areas of significant erosion or deposition. The magnitude of the observed change should be presented.
- The representativeness of historical surface sediment data (collected from the upper 15 centimeters).
- The text should present what areas of deepening are known to be associated with dredging activities and what areas are deepening due to river dynamics.

Appendix A, Section 4.0, p. 5, Representativeness of Historical Data - The conclusions should discuss the "representativeness" of historical data, based on the findings of this evaluation.

Appendix A, Tables 1a and 1b, Areas of Deepening- This table should present, to the extent possible, what areas of deepening are known to be associated with dredging activities and what areas are deepening due to river dynamics.

Appendix E, CD Presentation - The LWG should be commended for pulling together this CD presentation. The CD greatly enhanced the work plan and FSP. The LWG should be encouraged to continue to build on this presentation for subsequent plans and for presentation of the RI data as it is collected.

EPA Review Comments
LWG's Technical Memorandum: Benthic Analysis Approach
Portland Harbor Superfund Site (May 20, 2003)

The Technical Memorandum provides details on the benthic approach that the LWG generally described in an issue paper that was provided to the eco risk assessment sub-group participants during our "roadmap" discussions in Spring of 2003. EPA advised the LWG (email transmittal on March 19, 2003) of several concerns with the proposed approach, but indicated that it could move forward if the Respondents agreed to certain conditions that were listed in our March communication.

Overall, the approach presented in the Technical Memorandum does not address EPA's concerns and conditions. The following summarizes EPA's review of the proposal:

- 1) EPA required an alternative approach be described where and if the correlation approach fails. Figure 1-1 shows two boxes next to Box 8 that describes the need for an "alternative decision process where the predictive power of SQV is not adequate," but no process or approach has been presented. EPA's proposed approach and proposed bioassay samples begin to address this concern by having enough samples to start a traditional approach where a predictive approach fails.
- 2) EPA described its concern that sufficient nature and extent sampling needed to be completed prior to undertaking the proposed benthic approach. The LWG has not demonstrated that sufficient nature and extent have been conducted for their approach. EPA's proposed approach attempts to compromise between the efficiency of collecting sediment chemistry and bioassays at the same time and locating bioassays where sediment chemistry is not well characterized.
- 3) The LWG has proposed 68 bioassays. EPA believes more than 200 samples are needed to establish a predictive approach and to begin a traditional approach if needed.
- 4) Condition 2 required that the LWG's technical memorandum clearly link the proposed approach back to the assessment endpoint with clear testable hypotheses. This still needs to be done by the LWG and EPA.
- 5) The LWG has not agreed to take splits of the samples, as required in Condition 3.
- 6) The LWG has not agreed that a second round of sampling will be conducted using a traditional approach if acceptable correlations cannot be developed, as required by Condition 4.

- 7) Condition 5 required LWG to define up front what “it works” means, such as, acceptable correlation coefficients and levels of uncertainty. This still needs to be defined by the LWG and EPA.

The proposed approach is focused on predictability and reliability of the model at the expense of protection of the benthos. For example, on page 20, PAHs and metals are used to target areas for toxicity, excluding PCB's, pesticides and other analytes. They are stated as the primary drivers and the best predictor of toxicity. However, focusing on only PAHs and metals may miss local areas with other contaminants causing unacceptable benthic risk. While PAHs and metals may be the most pervasive contaminants, we also need to evaluate toxicity caused by other contaminants that may not be as widely distributed but could also be toxic to ecological receptors. Also, Probable Effects Concentrations (PECs) were selected over Probable Effects Levels (PELs) and Threshold Effects Levels (TELs) because they were thought to be more predictive, with less false positives, however, EPA is concerned about false negatives and the potential impacted benthic areas that may be missed.

We have also noted that the proposed toxicity test interpretation guidelines (pg. 33) seem to be adjusted to match observations using reference sediments. EPA does not agree that it is appropriate to adjust the guidelines to match these observations.

For the reasons described above, EPA is rejecting the proposed benthic approach. EPA has prepared an alternative benthic sampling plan coordinated with the alternative sediment chemistry plan (EPA Round 2 FSP). The proposed benthic sampling plan involves conducting bioassays to confirm areas that are indicated by chemistry to be toxic and areas that are in question of being toxic, but lack sufficient sediment chemistry. EPA's alternative Round 2 FSP is designed to achieve the objectives of the RI/FS in a shorter timeframe and should result in sufficient information upon which future sampling will truly be filling data gaps.

**Sampling Rationale
For
EPA's Round 2 Field Sampling Plan for Sediments in Portland Harbor**

Introduction

The LWG submitted a Draft Portland Harbor RI/FS Work Plan, dated March 31, 2003 and a Round 2A Field Sampling Plan (FSP), dated April 17, 2003 to EPA and its partners. EPA provided extensive comments on the Work Plan, and a revised document is scheduled to be submitted by November 26, 2003.

The purpose of the RI/FS stated in the Scope of Work (SOW) is to:

- Investigate the nature and extent of hazardous substances in the in-water portion of the site;
- Assess the potential risk to human health and the environment;
- Develop and evaluate potential remedial alternatives; and
- Recommend a preferred alternative.

The draft Work Plan states that "A critical objective of the RI/FS is to characterize the site sufficiently to allow EPA to define site boundaries and select a remedy for the river that is protective of the survival, growth, and reproduction of ecological receptorsand human receptors that may consume fish or come in contact with sediments, surface water, or ground water seeps from the site." EPA supports that objective statement.

Evaluation of the LWG's Round 2A Field Sampling Plan

EPA and its partners do not agree with the LWG that the purposes and objective stated above can be met in a reasonable time frame with the LWG's limited sampling proposed for Round 2A, and the undefined scope for future sampling.

The LWG's approach includes three rounds of sampling. Round 1 included the fish tissue (some sample results still pending), co-located sediment chemistry and beach sediment chemistry sampling conducted in 2002. Round 2 is proposed to gather the majority of remaining data for the RI and risk assessments. Round 3 is proposed to gather data for evaluation of FS alternatives and filling data gaps, if any, for the RI.

Using the process discussed in the Round 2A FSP, the LWG identified 95 stations for surface sediment sampling in Round 2A. Of these 95 stations, 68 stations would be analyzed for sediment chemistry and bioassays, and 27 would be analyzed for sediment chemistry only. A significant factor in designing the Round 2A sample plan was the LWG's use of most of the

historical sediment data which were collected during multiple investigations over the past decade. The proposed sampling approach is described as a biased approach with new sampling stations located in areas where, based on historical or current upland land use, higher chemical concentrations would be expected in sediments if releases of hazardous substances had occurred. Additional surface sediment samples are anticipated for Round 2B and possibly Round 3. Subsurface sediment chemistry would be evaluated as a part of Round 2B at a limited number of stations that meet the criteria defined by the LWG.

The FSP states "One of the objectives of Round 2A is to sample what are considered the worst-case areas to establish if unacceptable risks exist". The FSP provides that once risk from these worst-case areas was determined, future sampling would be focused only on those COPCs presenting an unacceptable risk. The FSP also states "If considered individually, many of these locations along the ISA have been adequately characterized, or nearly so, for their respective sources and COPCs."

While many major source areas in the river are known, EPA does not consider that sufficient sampling has occurred throughout the Portland Harbor site to know that all significant areas of contamination have been identified. Also, because sampling would be limited to known or suspected "worst-case" areas, there would be insufficient information about areas not sampled in Round 2A to limit the analyte list for future sampling, and to assume any other areas in the river were not contaminated. Therefore, much more sampling would be required after Round 2.

EPA also does not agree that any particular known source area has been adequately characterized. One or a few samples adjacent to potential sources is unlikely to be "worst-case" or representative due to the complex, dynamic environment, and limited knowledge of potential source areas. A higher sampling density is needed adjacent to potential sources and in known in-water source/hotspot areas. The limited sampling near most sources/hotspots is not sufficient to understand how these sources/hotspots impact the river, to characterize ecological and human health risks, to define potential Sediment Management Areas (SMA's), or to provide data to identify early action candidates or remedial alternatives. Therefore, adequate sampling to define the nature and extent of hazardous substances associated with individual sites must be included in the field sampling program.

Under the LWG's FSP, large areas of contamination could be missed in portions of Portland Harbor that are currently not well-characterized. All of the category 1 historic surface sediment chemistry sample locations and the LWG's proposed Round 2A sample locations combined still leave significant areas of the river unsampled. In order to calculate exposure point concentrations for smaller home-ranged species, it is essential to have more coverage than the LWG's plan provides.

Finally, the LWG's Round 2A FSP does not address subsurface contamination. EPA believes that samples at depth are needed since historic contaminant sources may be buried under more recent, relatively clean sediments deposited by the river system.

EPA's Round 2 Field Sampling Plan

EPA's plan provides a sampling strategy which characterizes nature and extent of contamination in the river for a RI/FS and ROD that could lead to an expeditious cleanup. EPA's plan targets both known major source areas and areas river-wide not well characterized or not sampled at all. The sampling location logic differs for the river wide contamination nature and extent (a grid sampling logic), than for the individual major sources near facilities along the river (source area sampling logic). Combining source area sampling and river-wide contaminant distribution sampling is intended to provide adequate sediment chemistry data for nature and extent characterization, and sufficient data necessary to complete a baseline risk assessment and begin to develop the Feasibility Study.

The EPA sampling program is a coordinated effort to develop a comprehensive sediment chemistry sampling strategy for Portland Harbor. To meet the objectives of the RI/FS in a timely fashion, the EPA team has increased the sediment sample density from that proposed by the LWG. After thoroughly evaluating the historical data as set forth later in this rationale, approximately 535 sediment sampling locations were identified, broken down into the following groups:

- 217 locations for the grid sampling (186 near shore and 31 mid-channel);
- 318 sample locations related to specific sources/areas of contamination;
- Out of the 535 sampling locations, 276 include sampling at depth.

In addition to the locations shown above, some additional beach sampling locations were identified to provide information related to shorebird habitat. These locations could add an additional 20 to 25 samples.

The purpose of the grid samples is to evaluate overall river sediment quality; identify potential contaminant source to define the nature and extent of contaminants within Portland Harbor; to ensure sufficient density to assess ecological risks; and evaluate the upstream and downstream areas of contamination adjacent to the initial study area. Source/hotspot specific sample locations were selected to characterize the nature and extent of in-water contaminated hotspots associated with specific sources of sediment contamination; to provide sufficient data to evaluate potential early action alternatives; and to provide sufficient data to assess localized risks to human health and ecological receptors.

In addition to increased sample density, another major difference between EPA's alternative sampling program and the one proposed by the LWG is the addition of samples collected at depth. EPA does not concur with the LWG's conclusion that subsurface sediment chemistry is needed only where boat scour may occur, where substantial historic releases are documented or in areas of sediment scour, and where maintenance dredging or shoreline development are expected. Subsurface contamination may provide information on ongoing sources or potential threats of releases of contaminants to the river. Moreover, understanding subsurface contaminant levels is critical to understanding the nature and extent of contaminants in Portland

Harbor and evaluating cleanup alternatives. Therefore, EPA's sampling program includes subsurface sampling to be conducted concurrent with surface sediment sampling.

And finally, as with any sampling effort, additional data gaps may be identified through evaluation of the sediment chemistry data proposed in this sampling program. These data gaps would need to be filled in subsequent sampling rounds.

(A) Sample Locations

The following paragraphs discuss how the grid and source/hotspot samples were selected by EPA and its partners. The enclosed figures show the selected sample locations. The enclosed tables list the samples selected for grid and sources/hotspots, including the chemicals that need to be analyzed in each sample.

Sample Design

EPA and its partners developed the field sampling (sediment chemistry and toxicity) plan using historical sediment chemistry and toxicity data from the LWG and GIS layers from many sources including the LWG, USEPA, City of Portland, Oregon DEQ and NOAA. NOAA's Query Manager (database query software) was used for query and analysis of historical chemical and biological data which was then brought into our GIS Project. ArcInfo 8.3 and ArcView 3.3 were used for spatial data analysis, sample plan generation and map production.

Sample Plan Creation

The first step in developing the sample plan was establishing a centerline of the Lower Willamette River extending from just upstream and just downstream of the ISA. Transects along the river were generated at 1/10th mile intervals generally perpendicular to the river centerline. These transects, which divide the river into approximately 528 foot segments, were used to segment the river. The nearshore zone, which extends from the -20 ft. depth contour to the riverbank on either side of the river, was used to create 2 nearshore zone cells (both banks) and a midchannel cell from each segment.

Nearshore Grid Samples

The first tier of nearshore samples was generated at the centroids of each nearshore zone cell. In general, within every river mile, 10 samples are located on each side of the river bank for a total of 20 nearshore samples within each river mile. Exceptions are nearshore areas where a bulkhead is present or odd-shaped areas (like slips). Sample locations were manually adjusted or removed in these cases.

A second tier of grid samples were placed farther out from shore on the 1/10th mile segments at the -30 ft. depth contour. These samples are staggered from the nearshore centroids by approximately 1/20th of a mile. The staggering allows for better spatial coverage both laterally and perpendicular to the shore. The intent of these deeper samples is to bound nearshore sample

locations, characterize contaminants associated with upland or nearshore sources migration towards the main channel and capture contaminant concentration gradients.

Mid-Channel Grid Samples

A third tier of grid samples was generated at the centroid of the main channel cells. A sampling density of generally one sample every three tenths of a mile was used at either end of the investigation area. A higher density of mid channel samples (one every tenth of a mile) were placed in areas where historical data indicate elevated levels of contamination within the main channel.

Source Samples

In an effort to characterize the nature and extent of current and historical sources of sediment contamination, samples were placed adjacent to known sources of contaminants and/or hotspots of contamination. In most cases, historical chemical, physical and biological data was used to place these additional samples. In other cases, knowledge about upland activities or historical use of the site was considered in the placement of samples. Thematic GIS layers were used to consider physical factors such as sediment type, shore structures or bank conditions, sediment transport (morphology) and sediment elevation difference analysis, bathymetric contours, dredged areas and the USACOE navigation channel. Historical sediment chemistry data including contaminant concentrations, suites of analytes, detection limits and sample date were integrated in our GIS for decision making.

Within this GIS context, DEQ project managers provided input on appropriate sample locations associated with specific upland sites. Based upon their knowledge of the site, including contaminant and toxicity data, the DEQ project managers made recommendations on sample numbers, locations, depth and analyte suites. Source sample locations were reconciled with grid samples in the nearshore, -30 ft. contour and mid channel to eliminate duplicate sampling locations.

EPA is aware that the City of Portland collected surface (0 to 15 centimeters) sediment samples adjacent to selected city stormwater outfalls within the Portland Harbor ISA in the Fall of 2002. These samples were analyzed for metals, SVOCs, PCBs (Aroclors), and pesticides. EPA's plan includes a "depth only" sample at city outfalls. Subsurface samples are needed at the outfalls to: define the nature and extent of contamination; provide insight into historical releases from these outfalls; and provide information to assess whether these deeper sediments present an ongoing source to surface sediments. Specifically, sediment cores should be advanced and samples from selected sediment intervals collected and analyzed to characterize whether these areas pose unacceptable risk or are acting as an ongoing contamination source to Portland Harbor. We have not identified analytes for these samples. The sample scheme proposed by EPA and its partners for the outfalls will be finalized following our review of the surface chemistry data.

(B) Sample Depth

Subsurface contamination may provide an ongoing source of contaminants in some locations or may pose a potential threat of a release in the future. An understanding subsurface contaminant levels is also critical to understanding the nature and extent of contaminants in Portland Harbor. EPA's sampling program includes a substantial subsurface sampling effort. In addition to the criteria proposed by the LWG, EPA considered the following: 1) areas of known surface sediment contamination (where we know we need to define the vertical extent of contamination); 2) areas of known or suspected historical contamination (i.e., contamination potentially buried by clean surface sediment; and 3) areas of known or suspected historical sediment contamination that may have contaminants mobilized by ground water passing through it.

Based on the presentation of available data and the approach proposed by the LWG in the RI Work Plan, it does not appear that all sources of contaminants and/or contaminant migration in the river, nor nature and extent of contamination in the river would be defined nor contaminant fate and transport understood after Round 2B. The dynamics of the river, together with the historical releases and long-term ground water and product discharges (at and below the sediment surface) has likely resulted in highly contaminated surface sediments in some locations, and also subsurface contaminants which have been covered by clean surface sediments deposited after those deeper sediment sources were in place. In addition, there are the ground water and product discharges from many old sites which are continuing to discharge to the sediments at depth (Atofina, Gasco, and Wacker). Sufficient sediment samples must be collected at depth to define the vertical extent of contamination, specifically at individual sites. The RI must develop a comprehensive site conceptual model that incorporates the sources, nature, and extent of contamination and understanding of contaminant fate and transport in the system to feed into the risk assessment process.

Although the historical data set includes some samples collected at depth, this data is limited with respect to overall characterization and analytical suites. The attached tables indicate which source/hotspot samples should be analyzed at depth and to what depth samples should be collected. The location and the depth of these samples was made concurrently with the selection of surface sediment samples. As with the surface sediment samples, the decision on subsurface sediment samples was based upon historical data, knowledge about upland activities or historical use of the site, and interviews with DEQ project managers. The number of samples at depth may be reduced by the use of field screening techniques (see Field Screening/Field Laboratory Section below). Visual inspection of cores may also help in selecting samples at depth for analysis.

(C) Historical Data

EPA and its partners used the historic category 1 surface sediment chemistry data in developing our sampling plan. We first developed a sampling plan without using the historic data, placing grid samples and source-specific samples as described above. We then brought in the historic data, and eliminated samples from our sampling plan wherever there was historic data close to a proposed sampling point. Our proximity evaluation followed these rules:

- Mid-channel grid samples: if there was a historic data point within a 500 foot radius of a proposed sample, and the historic station was collected from a depth of >30 feet, then our

sample was eliminated.

- 30-foot transect samples: if there was a historic data point within a 200 foot radius of a proposed sample, and the historic sample was collected from a depth of -15 to -25 feet, then our sample was eliminated.
- Near shore grid samples: if there was a historic data point within our nearshore grid cell, then our sample was eliminated.
- Source samples: if there was a historic data point within 100 feet of our proposed sample, then our sample was eliminated.

EPA and its partners value the historical data that the LWG has collected within Portland Harbor, and we used the data to the fullest extent possible. However, several factors were considered when deciding whether a historic data point could replace a proposed sampling location. These factors were considered on a sample-by-sample basis. In most cases, we eliminated samples from our proposed plan where nearby historic data met our proximity rules. However, in some cases, we decided that the historic data was not sufficient to replace a new sampling station. Factors that we used when making these decisions are listed below.

- Samples collected from areas that have since been dredged do not represent current conditions.
- Older samples and/or samples collected in areas of significant bathymetric change may not represent current conditions.
- Analytical suites for much of the historical data are limited. In addition, dioxin/furan congeners were analyzed in very few historic samples, despite the likelihood that these contaminants are associated with specific sources in Portland Harbor (e.g., wood treatment facilities, chemical manufacturers).
- Detection limits from the historical data are often very poor. The detection limits in the historical data do not allow for very much confidence that certain contaminants were not identified. For contaminants that were detected at relatively high frequencies in the historical data, this issue may not be as important as chemicals that were detected rarely, if at all.
- Historical data may not have adequate data validation for use in the RI and risk assessment.

The result of this historic data review is reflected in the sample locations selected in the attached tables and maps (i.e., the samples that we originally proposed but eliminated due to the presence of historic data nearby are not shown).

(D) Field Screening/Field Laboratory

The LWG Work Plan and FSP did not mention the use of field screening techniques or use of a field laboratory. The LWG should consider utilizing these options in the in-water sediment sampling effort where appropriate. Decision criteria for evaluating field screening or field laboratory results should be developed and approved prior to sampling.

Because of the relatively high cost associated with some analytical techniques, EPA and its partners are open to the use of field screening techniques to make decisions about which samples to send to a fixed laboratory for analysis. While field screening techniques generally do not yield data of sufficient quality for use in risk assessment, they can give "yes/no" type information about the presence of certain groups of contaminants. Field screening techniques could be useful in areas near sources where large numbers of samples are needed to characterize the depth and extent of in-water contamination. Field screening techniques should not be used for grid sample locations; the purpose of these samples is to characterize harbor-wide nature and extent of contaminants.

Access to a field laboratory for the field work would allow for quick turn around on sample analysis. This quick turn around would be extremely useful for site work so that decisions, including depth, lateral extent of sampling and modification of analytical suites, could be made while sampling personnel are in the field and equipment has been mobilized. In addition, it may be more cost-effective to have analyses conducted by a field laboratory rather than a standard laboratory. There can be considerable cost savings in the use of a field lab due to the decrease in time and labor necessary for processing samples.

EPA Team Benthic Approach Sampling Rationale

Introduction

As explained above, EPA and its partners feel that the sediment chemistry sampling proposed by the LWG for Round 2A is inadequate. Our concerns about sampling adequacy extend to the benthic toxicity sampling approach. The LWG developed an approach for benthic assessment that relies on finding a correlation between toxicity and chemistry. The LWG did a nice job of placing a limited number of samples, and the EPA team kept a large percentage of the LWG's proposed sediment chemistry and toxicity stations. However, EPA and its partners do not believe that the sampling proposed is sufficient to develop a predictive relationship. Moreover, the bioassay sampling proposed by the LWG would not provide sufficient data to meet other important objectives described below. We are therefore providing an alternate sampling plan that we believe will meet our shared objectives.

EPA's Alternate Approach

EPA's alternate sampling plan was developed specifically for the next round of sampling. Additional rounds of bioassay testing may be needed, especially if a predictive relationship between toxicity and sediment chemistry is not found after this round of sampling. The nature and extent data from this round would be used to guide future rounds of bioassay testing.

There are several advantages to placing bioassays this year including the cost savings in coordinating chemistry and bioassay sampling. Sediment chemistry samples will be taken in the next round to define nature and extent of contamination. Therefore, since bioassay testing requires a concurrent sediment chemistry sample, it is efficient to collect bioassay samples at the same time. We used the historic data to guide sample placement. However, the historic data is limited. Additional chemistry sampling may reveal hot spots or unusual chemicals that we were unaware of when this sampling plan was prepared. Additional bioassay testing may be required if this occurs.

EPA's bioassay sampling program is based on the following objectives:

1. **Confirm Toxicity.** We placed bioassays in high priority areas based on some indication that the sediment is toxic to the benthic community (PEC exceedances, information about chemistry and/or historic practices at upland sites, or toxicity in previous bioassay tests). Confirming toxicity in high priority areas will allow EPA to identify Sediment Management Areas and good candidate sites for early actions. Confirming toxicity will also provide useful information for the LWG to work with other potentially responsible parties.
2. **Support the development of a predictive relationship.** EPA hopes that a predictive relationship can be developed that will allow us to use sediment

chemistry information, including those samples with chemistry data but no toxicity data, in the benthic assessment. Due to the variety of chemical sources at Portland Harbor, the heterogeneity of the historical data, and the sheer size of the site, we believe that meeting this goal will require a substantial sampling effort.

3. **Determine toxicity where the physical environment or the form of the chemical may modify toxicity.** This would include special cases, or areas where the predictive relationship between chemistry and toxicity does not hold true (e.g. TBT bound in paint chips). A predictive approach may work over large areas of the site, but EPA recognizes that in some places, the physical form of the chemical may affect bioavailability. In such areas, EPA will use a more traditional approach, meaning the results of the bioassays will be used to determine directly whether or not an area is toxic to the benthic community, instead of relying on a relationship between chemistry and toxicity. It should be noted that bioassays results from these areas will not be used in the development of a predictive relationship.
4. **Determine the toxicity of chemicals for which no sediment quality values exist.** Any predictive approach will rely at least in part on national screening guidelines or other sediment quality values. There are some unusual chemical in Portland Harbor for which there are no screening guidelines (e.g., perchlorate, chlorinated herbicides). EPA's benthic approach will allow us to rely on a more traditional approach in areas where toxicity in the bioassays cannot be explained by chemicals in the national models.
5. **Provide at least moderate coverage across the entire site.** By sampling in areas where we don't have good chemistry information, we will increase our chances of developing a predictive model, get a good head start on a traditional approach in case the predictive approach fails, and provide sufficient data to confirm that sites where we don't expect toxicity are in fact clean.

Bioassay Station Selection

We placed bioassay stations after we determined the location of sediment chemistry stations. We then used the selected sediment chemistry stations as the basis for the selection of bioassay locations. This allowed us to minimize sampling costs and to build upon extensive work carried out to determine locations of sediment samples.

EPA's strategy for the next (first) round of bioassay sampling draws on two different "approaches," including a predictive approach and a more traditional approach. A traditional approach is recommended for areas where there is no relationship between sediment chemistry and toxicity in bioassay tests. It should also be used where the SQVs are not reliable, which is usually in the moderate range. McCormick and Baxter used a traditional approach to determine the sediment cap footprint. The contaminated area was gridded with bioassays, and the hit/no hit criteria determined the area toxic to the benthic community. A predictive approach draws on known relationship between sediment

chemistry and toxicity. Once this relationship is established, one can predict toxicity in areas where only sediment chemistry exists.

In order to develop a predictive relationship for Portland Harbor, we placed bioassays across a range of sediment chemistry conditions. We determined the maximum PEC quotient for all of the historic surface sediment chemistry. The objective of using national sediment quality guidelines is to draw off the large database of information relating toxicity to the benthic community to sediment chemistry in order to place bioassays in Portland Harbor. These SQVs will not be used as cleanup numbers, but were used to help us place bioassay samples. We selected bioassay stations across a range of PEC quotients, with an emphasis on areas with a maximum PEC quotient greater than three. We also placed samples across gradients of chemistry moving away from known significant sources. This will help us develop a predictive approach, and if a predictive approach fails, it will help us begin to draw sediment management unit boundaries based on toxicity.

We also placed bioassays in areas where little is known about the sediment chemistry. These samples will help build the predictive model database and will meet our goal of having minimum coverage across the site.

EPA and its partners selected a total of 223 bioassay sampling stations. The majority of these samples are placed within the nearshore zone, near contaminant sources, and in the river's most valuable habitat. We realize that collecting this many samples in one year will be a significant undertaking. However, we believe that at least 200 samples are required to develop a solid predictive approach. Gathering all of these samples in the next round of sampling provides the cost benefit of only having to gather sediment samples once and avoids any questions relating to varying conditions at different testing times.

Additional bioassays may be needed in the future depending on whether or not the predictive approach appears to work and if areas are determined to have conditions that are not appropriate for the application of such an approach.

This approach does not identify test interpretation rules, nor does it identify locations of reference and/or background samples. These issues will require further discussion with the LWG.

Finally, this approach does not cover all objectives related to a complete characterization of toxicity to the benthic community. For example, this approach does not address risk from bioaccumulative chemicals. Nor does it address risks posed by the discharge of contaminated groundwater into shallow porewater.

**EPA Round 2 Sediment
Chemistry and Toxicity Sampling Plan**
Nearshore and Mid-channel Grid Samples

11/05/2003

ID_STRING	X	Y	ZONE	BENTHIC	KEEP	SVOC	VOCS	TBT	METALS	PEST	PCB	DIOXFUR	CHLORHERB	HEXCHROM	ANALYTES
G1	7618835.29213	711289.69703	River miles 4-5	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G2	7620437.54093	711436.21081	River miles 4-5	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G3	7620592.88199	711128.91225	River miles 5-6	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G5	7621107.02172	710223.76031	River miles 5-6	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G6	7620081.15614	709526.58725	River miles 5-6	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G7	7621369.56035	709751.80354	River miles 5-6	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G8	7620386.04245	709105.46283	River miles 5-6	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G9	7621617.96180	709315.59816	River miles 5-6	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G10	7621923.22272	708961.49540	River miles 5-6	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G11	7621082.18120	708250.37043	River miles 5-6	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G12	7621469.28482	707834.70452	River miles 5-6	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G13	7622659.78093	708167.90484	River miles 5-6	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G14	7622997.91105	707819.20453	River miles 5-6	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G15	7621962.13236	707087.65374	River miles 5-6	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G16	7623344.75445	707451.17599	River miles 5-6	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G18	7623646.11693	707207.52919	River miles 6-7	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G20	7624416.14487	706669.36093	River miles 6-7	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G21	7626742.01384	703653.22763	River miles 6-7	Y		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G30	7628600.89507	700666.25203	River miles 7-8	Y		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G31	7630887.53839	701942.45306	River miles 7-8	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G33	7631414.36670	701703.37331	River miles 7-8	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G34	7629593.80418	700205.98474	River miles 7-8	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G35	7630156.04275	699827.20628	River miles 7-8	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G36	7635700.21545	695669.21023	River miles 9-10	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G37	7636833.29653	696528.12473	River miles 9-10	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G38	7636137.49016	695379.90239	River miles 9-10	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G39	7637266.73961	696261.11834	River miles 9-10	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G40	7636577.58858	695082.42370	River miles 9-10	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G41	7637714.81104	695977.55575	River miles 9-10	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G42	7637014.51839	694792.33190	River miles 9-10	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G44	7637466.31277	694283.21792	River miles 9-10	Y		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G45	7638622.78238	695487.33892	River miles 9-10	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G47	7639709.00904	694890.34026	River miles 9-10	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G48	7640012.87499	694368.26684	River miles 10-11	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G49	7640313.64271	693833.00862	River miles 10-11	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G51	7632527.45042	699783.30750	River miles 8-9	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G54	7630845.68600	699114.44094	River miles 8-9	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G55	7616495.53375	726306.09860	River miles 1-2	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G56	7617940.36324	725223.51064	River miles 1-2	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G58	7615849.84679	725273.16172	River miles 2-3	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G59	7615287.30215	723619.03851	River miles 2-3	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G60	7617005.14823	722787.72469	River miles 2-3	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G61	7616890.36962	722195.62107	River miles 2-3	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G62	7615226.68799	721849.86400	River miles 2-3	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G64	7616993.47155	719558.28126	River miles 3-4	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G68	7617226.43446	718624.84035	River miles 3-4	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G69	7615962.22100	717509.14695	River miles 3-4	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G70	7617410.91564	718159.49343	River miles 3-4	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G71	7616169.15138	717022.09073	River miles 3-4	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G72	7617633.60413	717692.56584	River miles 3-4	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G74	7617153.86451	714633.46764	River miles 4-5	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G75	7618634.63597	715252.76545	River miles 4-5	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G76	7618805.61221	714859.87358	River miles 4-5	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G78	7618444.35668	712197.51413	River miles 4-5	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G80	7618549.27569	711781.20162	River miles 4-5	N		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs

* Easting/Northing Coordinates
are in Oregon State Plane North NAD83, Feet

EPA Round 2 Sediment
Chemistry and Toxicity Sampling Plan
Nearshore and Mid-channel Grid Samples

11/05/2003

ID_STRING	X	Y	ZONE	BENTHIC_KEEP	SVOC	VOCS	TBT	METALS	PEST	PCB	DIOXFUR	CHLORHERB	HEXCHROM	ANALYTES
G81	7619881.23877	712534.92408	River miles 4-5	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G82	7620845.55774	710678.50974	River miles 5-6	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G83	7616853.39442	721279.87367	River miles 2-3	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G84	7616820.63624	720820.57781	River miles 2-3	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G85	7614805.82207	719467.55627	River miles 3-4	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G86	7614857.76530	719939.48793	River miles 3-4	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G87	7616908.36418	719929.43305	River miles 3-4	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G88	7616572.77143	716099.14204	River miles 3-4	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G90	7617867.98341	713179.79796	River miles 4-5	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G92	7616385.31665	716566.77368	River miles 3-4	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G93	7614925.81697	720447.69466	River miles 2-3	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G94	7616879.17977	720354.84449	River miles 3-4	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G95	7613203.91754	720326.71819	River miles 2-3	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G96	7617445.23474	724754.14705	River miles 2-3	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G97	7616998.78064	724492.65250	River miles 2-3	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G98	7616826.57691	724078.08797	River miles 2-3	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G99	7615563.31288	722696.06726	River miles 2-3	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G100	7616762.58060	722576.14049	River miles 2-3	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G101	7616746.22695	722069.17731	River miles 2-3	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G102	7616626.30018	721545.86049	River miles 2-3	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G103	7615623.27627	721104.31192	River miles 2-3	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G104	7616522.72706	721055.25097	River miles 2-3	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G105	7616795.28791	720586.44631	River miles 3-4	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G107	7615418.15956	719708.58010	River miles 3-4	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G108	7616855.25129	719741.50769	River miles 3-4	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G109	7615895.83711	718923.82515	River miles 3-4	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G110	7615912.19076	718362.34981	River miles 3-4	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G111	7615983.05658	717822.67933	River miles 3-4	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G112	7616288.32473	717359.32589	River miles 3-4	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G113	7617394.92177	717893.54515	River miles 3-4	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G115	7617018.78780	718825.70324	River miles 3-4	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G116	7616926.11711	719310.86155	River miles 3-4	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G117	7616522.72706	716879.61880	River miles 3-4	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G118	7617623.87288	717413.83806	River miles 3-4	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G119	7616631.75140	716405.36293	River miles 3-4	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G120	7616818.75644	715914.75341	River miles 3-4	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G121	7617989.10441	716367.20441	River miles 3-4	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G122	7617792.86060	716846.91150	River miles 3-4	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G123	7617007.88537	715418.69267	River miles 3-4	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G124	7617160.51944	714917.18071	River miles 4-5	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G125	7617422.17785	714459.27849	River miles 4-5	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G126	7617705.64113	713979.57140	River miles 4-5	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G127	7618675.95774	714998.94896	River miles 4-5	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G128	7618490.61637	715445.94875	River miles 4-5	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G129	7618314.56665	715982.80501	River miles 3-4	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G130	7617929.14103	713505.31553	River miles 4-5	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G131	7618141.73849	713014.70600	River miles 4-5	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G132	7618337.98229	712556.80378	River miles 4-5	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G133	7618594.18949	712098.90156	River miles 4-5	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G134	7618850.39669	711602.84082	River miles 4-5	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G135	7619090.25023	711101.32886	River miles 4-5	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G137	7620284.06674	709340.58580	River miles 5-6	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G138	7621167.16388	709934.76844	River miles 5-6	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G140	7620632.94462	710839.67045	River miles 5-6	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs
G141	7620344.03012	711270.31659	River miles 5-6	N	1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs

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ID_STRING	X	Y	ZONE	BENTHIC_KEEP	SVOC	VOCS	TBT	METALS	PEST	PCB	DIOXFUR	CHLORHERB	HEXCHROM	ANALYTES
G142	7620611.13975	708937.19574	River miles 5-6	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G143	7620998.17615	708522.90326	River miles 5-6	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G144	7621363.40769	708075.90347	River miles 5-6	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G145	7621685.02949	707694.31829	River miles 5-6	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G146	7622017.55372	707312.73310	River miles 5-6	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G147	7622737.11435	707912.36696	River miles 5-6	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G148	7622366.43160	708304.85458	River miles 5-6	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G149	7621412.46864	709476.86622	River miles 5-6	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G150	7622333.72430	706936.59913	River miles 5-6	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G151	7622775.27287	706576.81882	River miles 6-7	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G152	7623276.78483	706173.42876	River miles 6-7	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G153	7624105.36980	706696.74559	River miles 6-7	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G154	7623707.43096	707040.17226	River miles 6-7	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G155	7623467.57742	707252.76972	River miles 6-7	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G156	7623113.24832	707519.87934	River miles 5-6	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G157	7625801.27391	704616.05485	River miles 6-7	Y	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G158	7626285.85657	704374.52718	River miles 6-7	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G160	7627043.57572	703605.90559	River miles 7-8	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G161	7627430.61212	703257.02771	River miles 7-8	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G162	7628978.75773	703376.95448	River miles 7-8	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G164	7628428.18482	702155.88189	River miles 7-8	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G165	7628744.35540	701752.49184	River miles 7-8	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G166	7629115.03815	701392.71152	River miles 7-8	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G168	7629665.61106	702581.07681	River miles 7-8	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G171	7628851.67391	700365.84318	River miles 7-8	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G172	7629720.12323	700493.26073	River miles 7-8	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G174	7630423.33022	699740.99279	River miles 8-9	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G177	7630795.69577	699358.24461	River miles 8-9	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G178	7631107.26666	698978.20177	River miles 8-9	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G179	7631438.86110	698624.35155	River miles 8-9	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G180	7632238.58545	698579.88359	River miles 8-9	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G181	7632102.79318	699830.75073	River miles 8-9	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G182	7632658.32915	699561.10264	River miles 8-9	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G183	7633094.42651	699272.18814	River miles 8-9	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G184	7633372.43857	698966.91999	River miles 8-9	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G185	7633039.91434	697854.87174	River miles 8-9	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G186	7633912.10905	697255.23788	River miles 8-9	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G187	7634903.89618	697764.42514	River miles 8-9	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G188	7634408.16979	698094.72528	River miles 8-9	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G189	7634058.95756	698501.61864	River miles 8-9	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G192	7635651.04725	696066.87259	River miles 9-10	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G193	7636103.49825	695821.56783	River miles 9-10	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G195	7635280.36449	697407.87195	River miles 9-10	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G196	7635702.66663	697194.94014	River miles 9-10	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G197	7636114.40068	696835.49417	River miles 9-10	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G198	7636975.69296	696252.21396	River miles 9-10	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G199	7637428.14396	696001.45798	River miles 9-10	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G200	7637896.94862	695745.25079	River miles 9-10	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G202	7638752.78968	695211.03153	River miles 9-10	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G203	7637008.40026	695276.44613	River miles 9-10	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G204	7637439.04640	694971.17799	River miles 9-10	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G205	7637831.53401	694556.88550	River miles 9-10	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G206	7638207.66798	694186.20275	River miles 9-10	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G208	7638807.30184	693608.37375	River miles 10-11	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G210	7639799.42332	694551.43428	River miles 10-11	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs

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ID_STRING	X	Y	ZONE	BENTHIC_KEEP	SVOC	VOCS	TBT	METALS	PEST	PCB	DIOXFUR	CHLORHERB	HEXCHROM	ANALYTES
G211	7640126.49634	694060.82476	River miles 10-11	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G212	7639118.02121	693308.55682	River miles 10-11	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G213	7617354.98740	725762.67250	River miles 1-2	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G214	7615615.05585	724351.93825	River miles 2-3	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G215	7614060.08086	720185.58660	River miles 2-3	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G216	7616873.01857	719500.92045	River miles 3-4	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G218	7640569.37316	693370.72829	River miles 10-11	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G219	7639617.71982	692746.59312	River miles 10-11	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G220	7640826.83505	692965.73709	River miles 10-11	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G221	7639972.87497	692321.71749	River miles 10-11	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G222	7641129.90890	692553.84556	River miles 10-11	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G223	7640324.78556	691901.89103	River miles 10-11	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G224	7641441.51359	692142.30248	River miles 10-11	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G225	7640642.84664	691501.74047	River miles 10-11	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G226	7641790.70746	691733.35079	River miles 10-11	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G227	7642123.29831	691326.07765	River miles 10-11	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G228	7642430.02158	690922.38199	River miles 10-11	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G230	7642737.61752	690551.86864	River miles 10-11	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G231	7642006.38149	689895.61339	River miles 10-11	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G232	7640911.08433	690921.05686	River miles 10-11	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
G233	7641053.65226	690794.01167	River miles 10-11	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC235	7616763.52319	724899.85848	River miles 2-3	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC236	7616420.35522	723905.50943	River miles 2-3	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC237	7616054.97241	721855.43443	River miles 2-3	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC238	7616291.48619	719304.31289	River miles 3-4	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC239	7616847.58270	717845.74526	River miles 3-4	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC240	7617349.82408	717238.51054	River miles 3-4	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC242	7619476.95044	711625.29618	River miles 4-5	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC244	7620588.97230	709875.96915	River miles 5-6	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC245	7621137.96172	708995.27470	River miles 5-6	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC246	7621858.52999	708218.94708	River miles 5-6	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC247	7622556.41393	707433.85940	River miles 5-6	Y	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC248	7623251.09645	706711.58404	River miles 6-7	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC249	7623686.38118	706464.95806	River miles 6-7	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC250	7624162.87221	706171.36952	River miles 6-7	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC251	7624622.41063	705897.54564	River miles 6-7	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC252	7625056.38646	705659.98470	River miles 6-7	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC254	7626161.72307	705211.94877	River miles 6-7	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC255	7626472.86276	705066.34482	River miles 6-7	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC256	7627173.80164	704174.91741	River miles 6-7	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC259	7629453.97291	701925.65556	River miles 7-8	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC261	7629962.70275	701128.97826	River miles 7-8	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC263	7631809.55000	700424.31000	River miles 8-9	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC264	7636964.14027	695696.59636	River miles 9-10	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC266	7639470.93553	693961.59572	River miles 10-11	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC267	7640398.78452	692628.03397	River miles 10-11	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC268	7641327.93906	691248.35612	River miles 10-11	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC270	7617298.82300	716388.30932	River miles 3-4	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC271	7626800.74460	704525.82056	River miles 6-7	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC275	7618381.70835	714002.60627	River miles 4-5	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC276	7617881.95672	714932.87307	River miles 4-5	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs
MC277	7631343.66886	699524.15165	River miles 8-9	N	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs

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ID	X	Y	SITE_NAME	LOCATION	DEPTH	SVOC	VOCS	TBT	METALS	PEST	PCB	DIOXFUR	CHLORHERB	HEXCHROM	ANALYTES	BENTHIC
-9	7617426.10721	713857.63999	City Outfalls	Near Outfall	X	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, pest, PCBs	Y
-9	7619753.90804	709931.63883	City Outfalls	Near Outfall	X	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, pest, PCBs	Y
-9	7620752.27491	710917.23631	City Outfalls	Near Outfall	X	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, pest, PCBs	Y
-9	7622063.44306	708917.85456	City Outfalls	Near Outfall	X	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, pest, PCBs	Y
-9	7623254.74963	707519.54217	City Outfalls	Near Outfall	X	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, pest, PCBs	Y
-9	7629044.84962	700149.30684	City Outfalls	Near Outfall	X	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, pest, PCBs	N
-9	7631200.64610	698129.95167	City Outfalls	Near Outfall	X	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, pest, PCBs	N
-9	7633308.81421	699197.27189	City Outfalls	Near Outfall	X	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, pest, PCBs	Y
-9	7633310.73339	696673.56407	City Outfalls	Near Outfall	X	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, pest, PCBs	Y
-9	7634673.85553	700887.29259	City Outfalls	Near Outfall	X	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, pest, PCBs	Y
-9	7635923.93297	699864.50197	City Outfalls	Near Outfall	X	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, pest, PCBs	Y
-9	7636588.74130	696762.36467	City Outfalls	Near Outfall	X	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, pest, PCBs	Y
-9	7636701.95319	698430.84672	City Outfalls	Near Outfall	X	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, pest, PCBs	Y
-9	7637007.91620	698955.35474	City Outfalls	Near Outfall	X	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, pest, PCBs	Y
1	7617070.10508	723075.91981	Oregon Steel Mills	Abandoned outfall, south		1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, pest, PCBs	Y
2	7616987.69174	723178.93648	Oregon Steel Mills	Abandoned outfall, south	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, pest, PCBs	Y
3	7617157.66925	723359.21566	Oregon Steel Mills	Abandoned outfall-hist dock loc		1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, pest, PCBs	Y
4	7617064.95424	723374.66817	Oregon Steel Mills	Abandoned outfall-hist dock loc	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, pest, PCBs	Y
5	7617056.45808	723636.64727	Oregon Steel Mills	Dock - middle		1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, pest, PCBs	N
6	7617206.69654	723963.51725	Oregon Steel Mills	Dock - north end, submerged out		1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, pest, PCBs	N
7	7617332.79760	724106.08656	Oregon Steel Mills	Abandoned outfall, north		1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, pest, PCBs	N
8	7617446.11594	724039.12572	Oregon Steel Mills	Abandoned outfall, north		1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, pest, PCBs	Y
11	7617561.39460	724397.59375	Oregon Steel Mills	North current outfall	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, pest, PCBs	Y
12	7617494.45377	724429.16886	Oregon Steel Mills	North current outfall	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, pest, PCBs	Y
13	7617533.70012	724526.04454	Oregon Steel Mills	North current outfall	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, pest, PCBs	Y
14	7617594.80001	724505.89128	Oregon Steel Mills	North current outfall	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, pest, PCBs	Y
15	7616831.74016	721836.52014	Consolidated Metco	Adjacent to city outfall-53A		1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
16	7616909.39471	721842.79711	Consolidated Metco	Adjacent to city outfall-53A	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
17	7616865.64899	721874.76513	Consolidated Metco	Adjacent to city outfall-53A		1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
18	7616865.64899	721788.95622	Consolidated Metco	Adjacent to city outfall-53A	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
19	7616622.08366	723536.04900	Oregon Steel Mills	LWG-specified location	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, pest, PCBs	N
20	7617183.95032	723649.61779	Oregon Steel Mills	LWG-specified location, inside	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, pest, PCBs	Y
21	7617673.06056	717559.80801	Premier Edible Oil	West of outfall	X	1	1	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, VOCs, Pest, PCBs	Y
22	7617803.67315	717460.68711	Premier Edible Oil	South of outfalls	X	1	1	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, VOCs, Pest, PCBs	Y
23	7617451.30525	717956.05465	Premier Edible Oil	Off dock	X	1	1	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, VOCs, Pest, PCBs	Y
24	7619319.86749	717305.21168	International Slip	Off outfall	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, PCBs, TBT, Pest	Y
25	7619980.17189	717250.83367	International Slip	Two outfalls	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, PCBs, TBT, Pest	Y
26	7618680.92589	717326.57446	International Slip	Off outfall	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, PCBs, TBT, Pest	Y
27	7619969.24773	717003.94780	Northwest Pipe	Outfall 18	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, PCBs, TBT, Pest	Y
28	7619847.86825	717006.37539	International Slip	Outfall 17	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, PCBs, TBT, Pest	Y
29	7619893.99245	717108.33415	International Slip	Proposed by LWG	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, PCBs, TBT, Pest	Y
30	7619590.54374	717040.36164	International Slip	Outfalls 14, 15, 16	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, PCBs, TBT	N
31	7619505.57811	717042.78923	International Slip	Outfalls 14, 15, 16	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, PCBs, TBT, Pest	Y
32	7619206.98457	717047.64441	International Slip	Outfall 13	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, PCBs, TBT, Pest	Y
33	7618925.38417	717054.92718	International Slip	Outfall 12	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, PCBs, TBT, Pest	Y
34	7618675.34243	717084.05826	International Slip	Outfalls 11, 10	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, PCBs, TBT	N
35	7618592.80439	717088.91343	International Slip	Outfall 9	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, PCBs, TBT, Pest	Y
36	7618386.45926	717062.20995	International Slip	Outfall 8	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, PCBs, TBT, Pest	Y
37	7617983.47938	716948.11323	Schnitzer Steel	Outfall 7	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, PCBs, TBT, Pest	Y
38	7618034.45876	716712.63703	Schnitzer Steel	Outfall 6	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, PCBs, TBT, Pest	Y
39	7618277.21773	716278.09848	Schnitzer Steel	Outfall 5	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, PCBs, TBT, Pest	Y
40	7618342.76265	716108.16720	Schnitzer Steel	Outfall 4	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, PCBs, TBT, Pest	Y
41	7618454.43177	715850.84270	Schnitzer Steel	Outfall 3	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, PCBs, TBT, Pest	Y
42	7618575.81126	715598.37337	Schnitzer Steel	Outfall 2	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, PCBs, TBT, Pest	Y
44	7618444.72141	715748.88393	Schnitzer Steel	Dock with Conveyer	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, PCBs, TBT, Pest	Y
45	7619314.25317	717160.94313	International Slip	Channel Far inside Slip	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, PCBs, TBT	N
46	7618765.59218	717174.24400	International Slip	Mid Slip	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, PCBs, TBT, Pest	Y
47	7618050.67030	717200.84575	International Slip	Slip close to river	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, PCBs, TBT, Pest	Y
48	7617132.88942	718571.24414	Time Oil	North end of dock	X	1	1	0	1	0	0	1	0	0	0 TPH, SVOCs, metals, VOCs, dioxin/furan	N
50	7617244.54570	718501.43849	Time Oil	At outfall	X	1	1	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, VOCs, dioxin/furan, Pest, PCBs	Y

ID	X	Y	SITE NAME	LOCATION	DEPTH	SVOC	VOCS	TBT	METALS	PEST	PCB	DIOXFUR	CHLORHERB	HEXCHROM	ANALYTES	BENTHIC
51	7617364.20774	718365.28936	Time Oil	Another outfall	X	1	1	0	1	1	1	1	0	0	0 SVOCs, metals, VOCs, dioxin/furan, Pest, PCBs	Y
52	7615440.80098	718491.45863	Linnton Oil Fire Training Grounds	Adj to discharge disperse on be	X	1	1	0	1	1	1	1	0	0	0 SVOCs, metals, VOCs, PCBs, dioxin/furan, Pest	Y
53	7615457.24976	718663.72460	Linnton Oil Fire Training Grounds	Downstream of discharge point	X	1	1	0	0	0	1	1	0	0	0 SVOCs, metals, VOCs, PCBs, dioxin/furan	N
54	7615604.85313	718263.98388	Linnton Oil Fire Training Grounds	Adjacent to middle tower	X	1	1	0	1	1	1	1	0	0	0 SVOCs, metals, VOCs, PCBs, dioxin/furan, Pest	Y
55	7615798.16236	718121.56362	Georgia Pacific Linnton Site	North end of dock	X	1	0	0	1	1	1	1	0	0	0 SVOCs, metals, dioxin/furan, Pest, PCBs	Y
57	7616028.89149	717332.36612	Georgia Pacific Linnton Site	Outfall 4, LWG sample	X	1	0	0	1	1	1	1	0	0	0 SVOCs, metals, dioxin/furan, Pest, PCBs	Y
58	7616861.62231	715084.83523	Owens Corning - Linnton	Address PAHs at south end of si		1	0	0	1	1	1	1	0	0	0 SVOCs, metals, Pest, PCBs	Y
59	7616415.22877	716446.86740	Owens Corning - Linnton	Outfall	X	1	0	0	1	1	1	1	0	0	0 SVOCs, metals, Pest, PCBs	Y
60	7616987.53126	714895.91177	Kinder-Morgan	Outfall	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
61	7617048.97408	714767.68327	Kinder-Morgan	Seep-1, Sediment 1	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
62	7617134.45974	714578.01195	Kinder-Morgan	Seep 2, SS-24	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
63	7617169.18829	714513.89770	Kinder-Morgan	Seep 4, Outfall	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
64	7617209.25970	714441.76917	Kinder-Morgan	Seep 3, Sediment 3	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
65	7617316.11678	714222.71215	Kinder-Morgan	South end of dock	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
66	7617065.25309	715198.36740	Kinder-Morgan	North end of dock, on -30	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
67	7617338.00649	715238.08923	Kinder-Morgan	East of 66		1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
68	7617409.74443	714972.59063	Kinder-Morgan	East of site on -36		1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
69	7617575.62319	715242.14362	Kinder-Morgan	East of 67 on -40		1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
70	7618139.74092	712279.95621	Linnton Plywood Association	Outfall 2	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, PCBs, Pest	Y
71	7618109.92930	712423.05198	Linnton Plywood Association	Outfalls 3 and 4	X	1	0	0	1	0	1	1	0	0	0 TPH, SVOCs, metals, PCBs	N
72	7618111.91674	712582.04728	Linnton Plywood Association	Green Wood	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, PCBs, Pest	Y
73	7617976.77073	712824.51512	Linnton Plywood Association	Outfall 5, steam cleaning, shop	X	1	0	0	1	0	1	1	0	0	0 TPH, SVOCs, metals, PCBs	N
74	7617937.27034	712948.97863	Linnton Plywood Association	Outfall 6	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, PCBs, Pest	Y
75	7618382.50632	712004.67546	Linnton Plywood Association	Columbia Sand and Gravel outfall	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, PCBs, Pest	Y
90	7618862.57679	711075.81375	Arco/BP	SD039C southern, Transect 1	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
91	7618933.62647	711105.30960	Arco/BP	Middle transect 1	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
92	7619038.49073	711161.36281	Arco/BP	Transect 1, -30	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
93	7618820.40220	711145.59737	Arco/BP	Transect 2, nearshore	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
94	7618887.24589	711174.79375	Arco/BP	Middle transect 2	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
95	7618996.44957	711237.56241	Arco/BP	Transect 2, -30	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
96	7618749.45774	711242.81756	Arco/BP	Transect 3, nearshore	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
97	7618951.78083	711358.43075	Arco/BP	Transect 3, -30	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
98	7618667.23306	711386.49566	Arco/BP	Transect 4, nearshore and outfa	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
99	7618756.57053	711428.53683	Arco/BP	Transect 4, middle	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
100	7618859.04586	711483.71585	Arco/BP	Transect 4, -30	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
101	7618550.97530	711624.99176	Arco/BP	Transect 5, nearshore	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
102	7618717.88723	711706.59315	Arco/BP	Transect 5, middle	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
103	7618884.79916	711769.64877	Arco/BP	Transect 5, -40	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
104	7618952.95144	711018.53942	Arco/BP	north of dock	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
105	7619053.26894	710917.30000	Arco/BP	south of dock	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
106	7619169.11324	710960.97900	Arco/BP	south of dock, -30	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
107	7619119.73698	710729.29039	Arco/BP	south end property, outfall	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
108	7619174.00638	710764.58849	Mobil Oil Terminal	outfall transect -20/nearshore/	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
113	7619260.99163	710527.35599	Mobil Oil Terminal	Transect 2, nearshore/beach	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
114	7619318.98179	710564.25882	Mobil Oil Terminal	middle transect 2	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
115	7619400.69521	710606.43349	Mobil Oil Terminal	Transect 2, -30	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
116	7619340.06913	710421.91933	Mobil Oil Terminal	Transect 3, nearshore/beach	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
117	7619400.69521	710448.27849	Mobil Oil Terminal	Middle transect 3	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
118	7619477.13679	710495.72499	Mobil Oil Terminal	Transect 3, -30	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
119	7619463.95721	710195.23049	Mobil Oil Terminal	Transect 4, nearshore/beach	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
120	7619497.14479	710283.79712	Mobil Oil Terminal	Middle transect 4	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
121	7619561.68712	710317.13522	Mobil Oil Terminal	Transect 4, -30	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
122	7619635.29179	710013.35225	Mobil Oil Terminal	Transect 5, nearshore/beach	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
123	7619738.09254	710100.33749	Mobil Oil Terminal	Transect 5, -30	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
124	7619875.22797	709721.37535	Mobil Oil Terminal	Transect 6, nearshore outfall	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
125	7619959.50954	709765.57608	Mobil Oil Terminal	Transect 6, -20	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
126	7620110.22434	709481.77120	Mobil Oil Terminal	south end of property	X	1	0	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
127	7621687.96495	709091.43642	MarCom Shipyard	Downstream end of dry dock	X	1	1	1	1	0	0	0	0	0	0 TPH, SVOCs, metals, VOCs, TBT	N
128	7621764.92270	708910.53309	MarCom Shipyard	Adjacent to drydock	X	1	1	1	1	0	0	0	0	0	0 TPH, SVOCs, metals, VOCs, TBT	N
129	7622180.20460	708790.53413	MarCom Shipyard	transect 1, nearshore	X	1	1	1	1	1	1	1	0	0	0 TPH, SVOCs, metals, VOCs, TBT, Pest, PCBs	Y

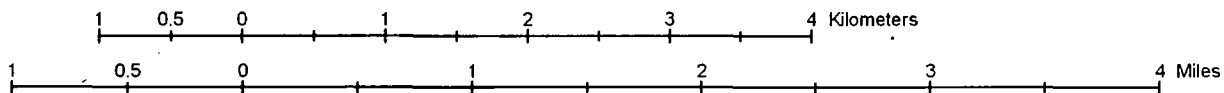
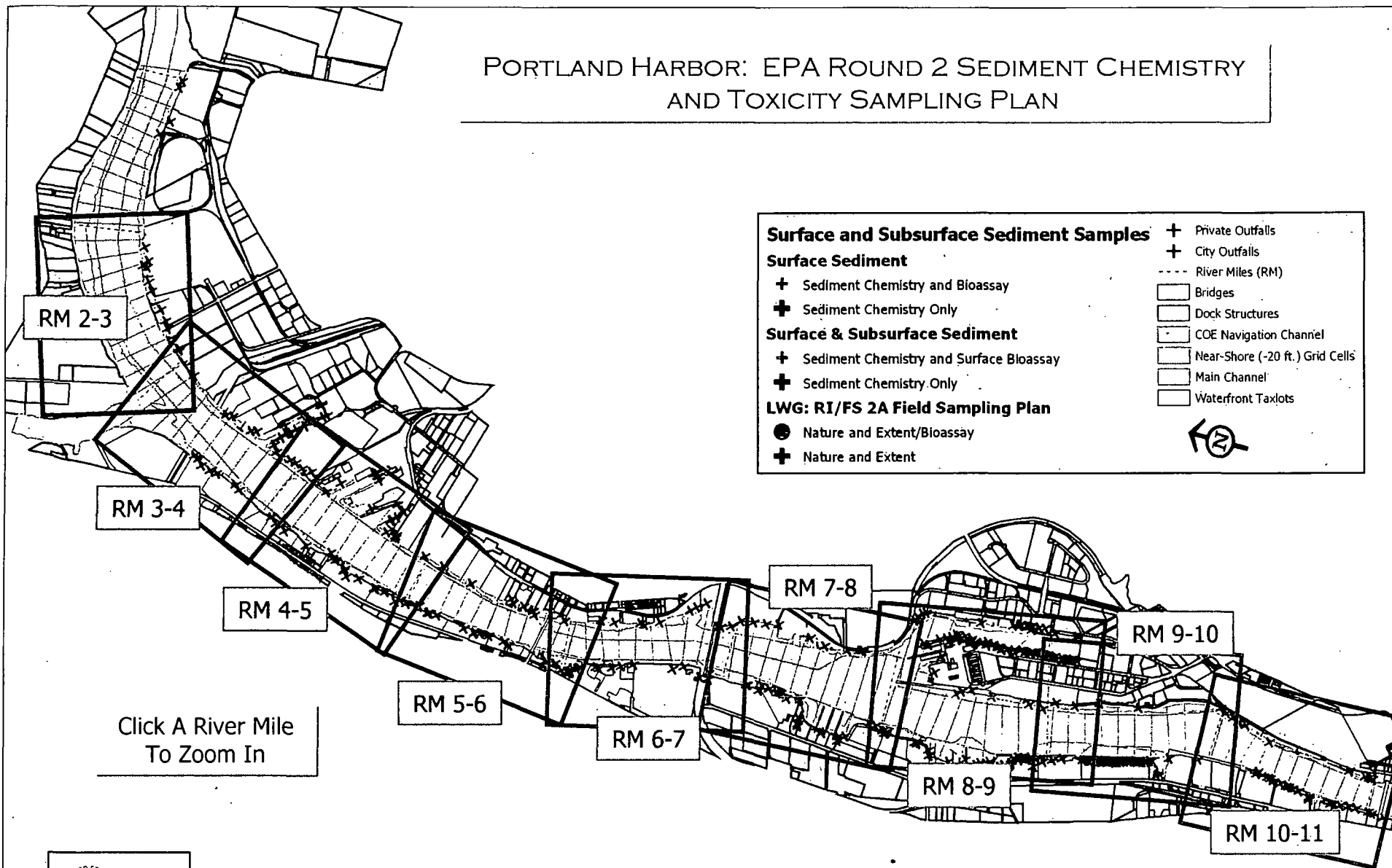
ID	X	Y	SITE NAME	LOCATION	DEPTH	SVOC	VOCs	TBT	METALS	PEST	PCB	DIOXIFUR	CHLORHERB	HEXCHROM	ANALYTES	BENTHIC
130	7622112.88454	708748.01620	MarCom Shipyard	middle transect 1	X	1	1	1	1	1	1	0	0	0	0 TPH, SVOCs, metals, VOCs, TBT, Pest, PCBs	Y
132	7622243.98150	708758.64568	MarCom Shipyard	Transect 2, nearshore	X	1	1	1	1	1	1	0	0	0	0 TPH, SVOCs, metals, VOCs, TBT, Pest, PCBs	Y
133	7622160.71722	708703.72669	MarCom Shipyard	middle transect 2	X	1	1	1	1	1	1	0	0	0	0 TPH, SVOCs, metals, VOCs, TBT, Pest, PCBs	Y
134	7622088.08242	708654.12243	MarCom Shipyard	Transect 2, -20	X	1	1	1	1	1	1	0	0	0	0 TPH, SVOCs, metals, VOCs, TBT, Pest, PCBs	Y
135	7622259.92573	708668.29508	MarCom Shipyard	Barge wreck nearshore	X	1	1	1	1	1	1	0	0	0	0 TPH, SVOCs, metals, VOCs, TBT, Pest, PCBs	Y
136	7622105.79822	708597.43185	MarCom Shipyard	Barge wreck -20	X	1	1	1	1	1	1	0	0	0	0 TPH, SVOCs, metals, VOCs, TBT, Pest, PCBs	Y
137	7622340.62781	708567.79814	MarCom Shipyard	outfall at south property line	X	1	1	1	1	1	1	0	0	0	0 TPH, SVOCs, metals, VOCs, TBT, Pest, PCBs	Y
139	7622170.38038	708446.83287	MarCom Shipyard	outfall -30	X	1	1	1	1	0	0	0	0	0	0 TPH, SVOCs, metals, VOCs, TBT	N
140	7621385.88956	707737.79752	Marine Finance	Seeps north end of property	X	1	0	1	1	1	1	0	0	0	0 TPH, SVOCs, metals, TBT, Pest, PCBs	Y
141	7621494.72722	707751.03454	Marine Finance	Houseboat construction	X	1	0	1	1	1	1	0	0	0	0 TPH, SVOCs, metals, TBT, Pest, PCBs	Y
143	7621732.67553	707548.54871	Marine Finance	north of dock	X	1	0	1	1	1	1	0	0	0	0 TPH, SVOCs, metals, TBT, Pest, PCBs	Y
144	7621782.41227	707486.37778	Marine Finance	south of dock	X	1	0	1	1	1	1	0	0	0	0 TPH, SVOCs, metals, TBT, Pest, PCBs	Y
145	7622021.77034	707181.74024	Marine Finance	south of St. Johns bridge	X	1	0	1	1	1	1	0	0	0	0 TPH, SVOCs, metals, TBT, Pest, PCBs	Y
146	7622170.98056	706985.90182	Marine Finance	south of tow boat dock	X	1	0	1	1	1	1	0	0	0	0 TPH, SVOCs, metals, TBT, Pest, PCBs	Y
147	7621595.62472	708042.23258	rm5-6 oily extents	upstream of oily extent	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
148	7621482.42057	708116.35050	rm5-6 oily extents	downstream west of oily extent	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
149	7621535.88378	708159.30519	rm5-6 oily extents	downstream east of oily extent	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
150	7621551.93603	708094.14294	rm5-6 oily extents	on oily extent	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
151	7620682.27697	708681.68503	Brix Maritime	North outfall		1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, TBT, Pest, PCBs	Y
152	7620782.04391	708614.94335	Brix Maritime	end of dock		1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, TBT, Pest, PCBs	Y
153	7620840.09033	708492.10805	Brix Maritime	In slip middle		1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, TBT, Pest, PCBs	Y
154	7620915.41586	708506.83087	Brix Maritime	outside slip middle	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, TBT, Pest, PCBs	Y
155	7620878.11363	708441.55198	Brix Maritime	in slip south	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, TBT, Pest, PCBs	Y
156	7620974.86627	708344.79934	Brix Maritime	South outfall	X	1	1	1	1	1	1	0	0	0	0 SVOCs, metals, VOCs, TBT, Pest, PCBs	Y
157	7623389.70556	705958.37399	Gasco	transect 1, nearshore	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
159	7623527.25274	706165.67657	Gasco	Transect 1, -30	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
160	7623627.85541	706322.63228	Gasco	Transect 1, -40	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
161	7623157.57081	706106.51798	Gasco	Transect 2, nearshore	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
164	7623395.72065	706491.49893	Gasco	Transect 2, -40	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	N
173	7623645.20921	705819.64930	Gasco	Transect 5, nearshore	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
174	7623672.83944	705874.45567	Gasco	Transect 5, -5	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
175	7623767.21439	706037.31322	Gasco	Transect 5, -30	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
176	7623854.00195	706202.90337	Gasco	Transect 5, -40	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	N
178	7623884.27564	705694.55755	Gasco	Transect 6, -5	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
179	7623925.72098	705765.35999	Gasco	Transect 6, -30	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
181	7623888.98284	705646.25020	Gasco	Transect 7, nearshore	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
182	7623937.27611	705743.68528	Gasco	Transect 7, -5	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	N
183	7624016.16868	705874.27545	Gasco	Transect 7, -30	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
184	7624099.50246	706034.68493	Gasco	Transect 7, -40	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
185	7624126.10082	705514.51799	Gasco	Transect 8, nearshore	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
186	7624161.91141	705585.71489	Gasco	Transect 8, -5	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
187	7624249.83289	705740.81635	Gasco	Transect 8, -30	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
188	7624327.98600	705889.13761	Gasco	Transect 8, -40	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	N
193	7624314.27099	705428.61665	Gasco	Transect 10, nearshore	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
194	7624350.53565	705494.23843	Gasco	Transect 10, -5	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
195	7624451.81817	705675.63768	Gasco	Transect 10, -30	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
197	7624440.33388	705312.91509	Wacker	Transect 11, nearshore	X	1	0	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, Pest, PCBs	Y
199	7624569.70163	705528.19258	Wacker	Transect 11, -30	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
200	7624683.63607	705721.23786	Wacker	Transect 11, -40	X	1	0	0	1	0	0	0	0	0	0 TPH, SVOCs, metals	N
201	7624614.74966	705257.65465	Wacker	Transect 12, nearshore	X	1	1	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, VOCs, Pest, PCBs	Y
202	7624649.28744	705316.36887	Wacker	Transect 12, -5	X	1	1	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, VOCs, Pest, PCBs	Y
203	7624749.29808	705466.02457	Wacker	Transect 12, -30	X	1	1	0	1	0	0	0	0	0	0 TPH, SVOCs, metals, VOCs	N
204	7624859.77875	705641.80097	Wacker	Transect 12, -40	X	1	1	0	1	0	0	0	0	0	0 TPH, SVOCs, metals, VOCs	N
207	7625013.51209	705350.32301	Wacker	Transect 13, -30	X	1	1	0	1	0	0	0	0	0	0 TPH, SVOCs, metals, VOCs	N
209	7625113.82057	704951.99530	Wacker	Transect 14, nearshore	X	1	1	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, VOCs, Pest, PCBs	Y
210	7625153.53901	705014.16331	Wacker	Transect 14, -5	X	1	1	0	1	1	1	0	0	0	0 TPH, SVOCs, metals, VOCs, Pest, PCBs	Y
211	7625270.81854	705203.53745	Wacker	Transect 14, -30	X	1	1	0	1	0	0	0	0	0	0 TPH, SVOCs, metals, VOCs	N
212	7625379.57232	705374.13319	Wacker	Transect 14, -40	X	1	1	0	1	0	0	0	0	0	0 TPH, SVOCs, metals, VOCs	N
213	7625518.75092	704711.00537	Wacker	Transect 15, nearshore	X	1	1	0	1	1	1	1	1	1	0 TPH, SVOCs, metals, VOCs, Pest, PCBs, chlorinated herbicides, dioxin/furan	Y
214	7625552.76941	704790.38184	Wacker	Transect 15, -5	X	1	1	0	1	1	1	1	1	1	0 TPH, SVOCs, metals, VOCs, Pest, PCBs, chlorinated herbicides, dioxin/furan	Y

ID	X	Y	SITE_NAME	LOCATION	DEPTH	SVOC	VOCS	TBT	METALS	PEST	PCB	DIOXIFUR	CHLORHERB	HEXCHROM	ANALYTES	BENTHIC
215	7625685.20447	704987.15863	Wacker	Transect 15, -30	X	1	1	0	1	1	1	1	1	1	0 TPH, SVOCs, metals, VOCs, Pest, PCBs, chlorinated herbicides, dioxin/furan	N
216	7625805.33394	705197.12253	Wacker	Transect 15, -40	X	1	1	0	1	1	1	1	1	1	0 TPH, SVOCs, metals, VOCs, Pest, PCBs, chlorinated herbicides, dioxin/furan	N
217	7626029.02826	704367.04064	Wacker	Transect 16, nearshore	X	1	1	0	1	1	1	1	1	1	0 TPH, SVOCs, metals, VOCs, Pest, PCBs, chlorinated herbicides, dioxin/furan	Y
218	7626081.94591	704446.41712	Wacker	Transect 16, -5	X	1	1	0	1	1	1	1	1	1	0 TPH, SVOCs, metals, VOCs, Pest, PCBs, chlorinated herbicides, dioxin/furan	Y
219	7626210.60114	704669.65272	Wacker	Transect 16, -35	X	1	1	0	1	1	1	1	1	1	0 TPH, SVOCs, metals, VOCs, Pest, PCBs, chlorinated herbicides, dioxin/furan	N
220	7626360.96927	704902.29562	Wacker	Transect 16, -40	X	1	1	0	1	1	1	1	1	1	0 TPH, SVOCs, metals, VOCs, Pest, PCBs, chlorinated herbicides, dioxin/furan	N
221	7628237.07545	702096.11694	Atofina	North metal transect, nearshore	X	1	0	0	1	1	1	1	0	0	1 SVOCs, metals, pesticides, hexavalent chromium, PCBs	Y
222	7628301.11400	702149.48239	Atofina	North metal transect -20	X	1	0	0	1	1	1	1	0	0	1 SVOCs, metals, pesticides, hexavalent chromium, PCBs	Y
223	7628371.36750	701925.34747	Atofina	South metal transect, nearshore	X	1	0	0	1	1	1	1	0	0	1 SVOCs, metals, pesticides, hexavalent chromium, PCBs	Y
224	7628446.07914	701983.17107	Atofina	South metal transect, -20	X	1	0	0	1	1	1	1	0	0	1 SVOCs, metals, pesticides, hexavalent chromium, PCBs	Y
225	7627271.16068	703067.36826	Atofina	transect 1, nearshore	X	1	0	0	1	1	1	1	0	0	1 SVOCs, metals, pesticides, hexavalent chromium, PCBs	Y
226	7627571.60820	703333.66189	Atofina	Middle transect 1	X	1	0	0	1	1	1	1	0	0	1 SVOCs, metals, pesticides, hexavalent chromium	N
227	7627868.85380	703611.69592	Atofina	Transect 1, channel	X	1	0	0	1	1	1	1	0	0	1 SVOCs, metals, pesticides, hexavalent chromium	N
228	7628407.84491	702933.95461	Atofina	Transect 2, channel	X	1	0	0	1	1	1	1	0	0	1 SVOCs, metals, pesticides, hexavalent chromium	N
229	7628738.71075	703259.48390	Atofina	Transect 2, across river from s	X	1	0	0	1	1	1	1	0	0	1 SVOCs, metals, pesticides, hexavalent chromium	N
230	7627746.11324	702757.84860	Atofina	Northern dock	X	1	0	0	1	1	1	1	0	0	1 SVOCs, metals, pesticides, hexavalent chromium, PCBs	Y
231	7628162.36381	702304.24222	Atofina	Middle dock	X	1	0	0	1	1	1	1	0	0	1 SVOCs, metals, pesticides, hexavalent chromium	N
232	7628541.25856	701807.94347	Atofina	Southern dock	X	1	0	0	1	1	1	1	0	0	1 SVOCs, metals, pesticides, hexavalent chromium, PCBs	Y
233	7626305.92477	704072.39212	Rhone Poulenc	transect 1, nearshore	X	1	1	0	1	1	1	1	1	1	0 SVOCs, metals, VOCs, pest, PCBs, chlorinated herbicides, dioxin/furan	Y
234	7626379.14592	704163.96060	Rhone Poulenc	Transect 1, -20	X	1	1	0	1	1	1	1	1	1	0 SVOCs, metals, VOCs, pest, PCBs, chlorinated herbicides, dioxin/furan	Y
235	7626482.47687	704265.11871	Rhone Poulenc	Transect 1, -30	X	1	1	0	1	1	1	1	1	1	0 SVOCs, metals, VOCs, pest, PCBs, chlorinated herbicides, dioxin/furan	N
236	7626480.23766	703888.93212	Rhone Poulenc	Transect 2, nearshore	X	1	1	0	1	1	1	1	1	1	0 SVOCs, metals, VOCs, pest, PCBs, chlorinated herbicides, dioxin/furan	Y
237	7626540.69622	703956.10830	Rhone Poulenc	Transect 2, -20	X	1	1	0	1	1	1	1	1	1	0 SVOCs, metals, VOCs, pest, PCBs, chlorinated herbicides, dioxin/furan	Y
238	7626643.69969	704059.11177	Rhone Poulenc	Transect 2, -30	X	1	1	0	1	1	1	1	1	1	0 SVOCs, metals, VOCs, pest, PCBs, chlorinated herbicides, dioxin/furan	N
239	7626292.14437	704173.31127	Rhone Poulenc	Southeast boundary of Wacker	X	1	1	0	1	1	1	1	1	1	0 SVOCs, metals, VOCs, pest, PCBs, chlorinated herbicides, dioxin/furan	Y
240	7626379.47340	704274.07554	Rhone Poulenc	Farther in river from 239	X	1	1	0	1	1	1	1	1	1	0 SVOCs, metals, VOCs, pest, PCBs, chlorinated herbicides, dioxin/furan	N
241	7626435.45354	703994.17480	Rhone Poulenc	South of bridge, nearshore	X	1	1	0	1	1	1	1	1	1	0 SVOCs, metals, VOCs, pest, PCBs, chlorinated herbicides, dioxin/furan	Y
242	7626538.45702	704074.78621	Rhone Poulenc	Farther in river from 241	X	1	1	0	1	1	1	1	1	1	0 SVOCs, metals, VOCs, pest, PCBs, chlorinated herbicides, dioxin/furan	N
243	7626180.46397	704325.29737	Rhone Poulenc	Farthest north	X	1	1	0	1	1	1	1	1	1	0 SVOCs, metals, VOCs, pest, PCBs, chlorinated herbicides, dioxin/furan	Y
244	7624590.52811	706391.47744	Willamette Cove	Most northwest	X	1	0	0	1	1	1	1	0	0	0 SVOCs, metals, Pest, PCBs	N
245	7624880.25393	706427.88092	Willamette Cove	Nearshore of 244	X	1	0	0	1	1	1	1	0	0	0 SVOCs, metals, Pest, PCBs	Y
246	7625053.88154	706135.27025	Willamette Cove	outfall -30	X	1	0	0	1	0	0	0	0	0	0 SVOCs, metals	N
247	7625178.42075	706278.38361	Willamette Cove	north of outfall	X	1	0	0	1	1	1	1	0	0	0 SVOCs, metals, Pest, PCBs	N
248	7625506.33255	705971.73374	Willamette Cove	south of outfall	X	1	0	0	1	1	1	1	0	0	0 SVOCs, metals, Pest, PCBs	N
249	7625339.71305	706172.62229	Willamette Cove	west of outfall -30	X	1	0	0	1	1	1	1	0	0	0 SVOCs, metals, Pest, PCBs	Y
250	7625777.45737	705961.31809	Willamette Cove	Another outfall	X	1	0	0	1	1	1	1	0	0	0 SVOCs, metals, Pest, PCBs	Y
251	7625958.78355	705791.84358	Willamette Cove	south of outfall, -30	X	1	0	1	1	0	0	0	0	0	0 SVOCs, metals, TBT	N
252	7626033.29944	705963.14709	Willamette Cove	east of outfall	X	1	0	0	1	1	1	1	0	0	0 SVOCs, metals, Pest, PCBs	Y
253	7626188.24621	705525.02176	Willamette Cove	mouth of WC -40	X	1	0	1	1	0	0	0	0	0	0 SVOCs, metals, TBT	N
255	7626542.06377	705497.47787	Willamette Cove	mouth of WC -30	X	1	0	1	1	1	1	1	0	0	0 SVOCs, metals, TBT, Pest, PCBs	N
256	7626700.51837	705771.50178	Willamette Cove	north side of WC, -20	X	1	0	1	1	1	1	1	0	0	0 SVOCs, metals, TBT, Pest, PCBs	Y
257	7626813.37625	705519.67877	Willamette Cove	center of WC	X	1	0	1	1	0	0	0	0	0	0 SVOCs, metals, TBT	N
258	7627037.78191	705722.71246	Willamette Cove	next to outfall -20	X	1	0	1	1	1	1	1	0	0	0 SVOCs, metals, TBT, Pest, PCBs	Y
259	7627112.16424	705483.74690	Willamette Cove	center of WC, -20	X	1	0	0	1	1	1	1	0	0	0 SVOCs, metals, Pest, PCBs	Y
260	7627353.01843	705701.34049	Willamette Cove	nearshore, next to outfall	X	1	0	0	1	1	1	1	0	0	0 SVOCs, metals, Pest, PCBs	Y
261	7623959.11483	707010.83396	Crawford Street	Nearshore, downstream end of be	X	1	0	0	1	1	1	1	0	0	0 SVOCs, metals, TBT, Pest, PCBs	Y
262	7624128.68423	706913.00546	Crawford Street	Nearshore downstream of outfall	X	1	0	0	1	1	1	1	0	0	0 SVOCs, metals, TBT, Pest, PCBs	Y
263	7629689.14576	703123.72663	Triangle Park	outfall in cove	X	1	0	1	1	1	1	1	0	0	0 TPH, SVOCs, metals, pest, PCBs, TBT	Y
264	7629500.21682	703269.05658	Triangle Park	downstream edge of cove	X	1	0	1	1	1	1	1	0	0	0 TPH, SVOCs, metals, pest, PCBs, TBT	Y
265	7629950.73968	702678.04809	Triangle Park	upstream outfall	X	1	0	1	1	1	1	1	0	0	0 TPH, SVOCs, metals, pest, PCBs, TBT	Y
266	7629844.16438	703080.12764	Triangle Park	high concs in cove	X	1	0	1	1	1	1	1	0	0	0 TPH, SVOCs, metals, pest, PCBs, TBT	Y
267	7628421.60767	701030.65394	Willbridge	NW corner Willbridge cove	X	1	1	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, VOCs, Pesticides, PCBs	Y
268	7629339.25128	701083.35645	Willbridge	Off Chevron Pier	X	1	1	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, VOCs, Pesticides	N
269	7629240.04657	700023.10606	Willbridge	SW corner Willbridge cove	X	1	1	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, VOCs, Pesticides, PCBs	Y
270	7629844.57530	700119.21063	Willbridge	McCall Pier	X	1	1	0	1	1	1	1	0	0	0 TPH, SVOCs, metals, VOCs, Pesticides, PCBs	Y
271	7633947.10232	700769.31239	Portland Shipyard	Swan Island Lagoon PSY shorelin	X	1	0	1	1	1	1	1	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
272	7634329.77027	700447.49684	Portland Shipyard	Swan Island Lagoon PSY shorelin	X	1	0	1	1	1	1	1	0	0	0 SVOCs, metals, PCBs, TBT, Pest	N
273	7634712.43821	700125.68129	Portland Shipyard	Swan Island Lagoon PSY shorelin	X	1	0	1	1	0	1	1	0	0	0 SVOCs, metals, PCBs, TBT	Y
275	7635477.77409	699482.05020	Portland Shipyard	Swan Island Lagoon PSY shorelin	X	1	0	1	1	1	1	1	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
276	7635860.44203	699160.23465	Portland Shipyard	Swan Island Lagoon PSY shorelin	X	1	0	1	1	0	1	1	0	0	0 SVOCs, metals, PCBs, TBT	N

ID	X	Y	SITE_NAME	LOCATION	DEPTH	SVOC	VOCS	TBT	METALS	PEST	PCB	DIOXFUR	CHLORHERB	HEXCHROM	ANALYTES	BENTHIC
277	7636243.10997	698838.41911	Portland Shipyard	Swan Island Lagoon PSY shoreline	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
278	7633981.95149	701096.62546	Portland Shipyard	Swan Island Lagoon Center Trans	X	1	0	1	1	0	1	0	0	0	0 SVOCs, metals, PCBs, TBT	N
279	7634373.90384	700779.00890	Portland Shipyard	Swan Island Lagoon Center Trans	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
280	7634752.34059	700461.39234	Portland Shipyard	Swan Island Lagoon Center Trans	X	1	0	1	1	0	1	0	0	0	0 SVOCs, metals, PCBs, TBT	N
285	7634433.72288	701090.22522	Portland Shipyard	SI Lagoon mainland shoreline	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
286	7634905.73190	700642.70874	Portland Shipyard	SI Lagoon mainland shoreline	X	1	0	1	1	0	1	0	0	0	0 SVOCs, metals, PCBs, TBT	N
287	7635259.56884	700348.29753	Portland Shipyard	SI Lagoon mainland shoreline	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
289	7636126.71246	699718.92833	Portland Shipyard	SI Lagoon mainland shoreline	X	1	0	1	1	0	1	0	0	0	0 SVOCs, metals, PCBs, TBT	N
290	7636468.82157	699434.20687	Portland Shipyard	SI Lagoon mainland shoreline	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
291	7633246.31678	701940.77826	Portland Shipyard	Coast Guard	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
292	7630486.98845	701579.51002	Portland Shipyard	downstream of shipyard	X	1	0	1	1	0	1	0	0	0	0 SVOCs, metals, PCBs, TBT	N
294	7631337.02558	701318.70317	Portland Shipyard	downstream of shipyard	X	1	0	1	1	0	1	0	0	0	0 SVOCs, metals, PCBs, TBT	N
295	7632689.35737	701608.48855	Portland Shipyard	downstream of shipyard	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
296	7631249.77993	698272.88645	Shaver Transportation	near shoreline seep / outfall	X	1	0	1	1	0	1	0	0	0	0 SVOCs, metals, PCBs, TBT	N
297	7631326.75207	698070.67337	Shaver Transportation	inside dock	X	1	0	1	1	0	1	0	0	0	0 SVOCs, metals, PCBs, TBT	N
299	7630378.95408	699449.93142	Front Avenue LLP	near Front Avenue outfall	X	1	0	0	1	1	1	0	0	0	0 SVOCs, metals, PCBs, Pest	Y
300	7631482.24499	697829.50727	Lakeside Industries	In front of Lakeside Industries	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, pest, PCBs, TBT	Y
301	7631607.93987	697644.82921	Lakeside Industries	Off of private outfall	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, pest, PCBs, TBT	N
302	7633136.42162	697103.53308	Shell/ Texaco	At dock	X	1	0	1	1	0	1	0	0	0	0 TPH, SVOCs, metals, TBT, PCBs	N
303	7633386.26849	696940.84210	Shell/ Texaco	At dock	X	1	0	1	1	1	1	0	0	0	0 TPH, SVOCs, metals, TBT, PCBs, Pest	Y
304	7632111.95506	697528.56248	Gunderson	Adjacent to southern dock	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
305	7631929.10535	697829.82735	Gunderson	at end of northern dock	X	1	0	1	1	0	1	0	0	0	0 SVOCs, metals, PCBs, TBT	N
307	7632335.09472	697561.87437	Gunderson	ds of southern dock	X	1	0	1	1	0	1	0	0	0	0 SVOCs, metals, PCBs, TBT	N
308	7632184.87865	697241.14277	Gunderson	off Gunderson	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
309	7632448.77174	697249.26255	Gunderson	off Gunderson	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
310	7632643.64664	697103.10638	Gunderson	off Gunderson	X	1	0	1	1	0	1	0	0	0	0 SVOCs, metals, PCBs, TBT	N
312	7633660.75365	696966.67823	Gunderson	Gunderson box	X	1	0	1	1	0	1	0	0	0	0 SVOCs, metals, PCBs, TBT	N
313	7633522.75301	696754.86328	Gunderson	Gunderson box	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
315	7633734.56795	696652.16512	Gunderson	Gunderson box	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
316	7634078.85839	696768.46124	Gunderson	Gunderson box	X	1	0	1	1	0	1	0	0	0	0 SVOCs, metals, PCBs, TBT	N
317	7633950.58519	696548.30441	Gunderson	Gunderson box	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
318	7634234.87862	696530.10963	Gunderson	Gunderson box	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
319	7634519.17204	696511.91485	Gunderson	Gunderson box	X	1	0	1	1	0	1	0	0	0	0 SVOCs, metals, PCBs, TBT	N
320	7634390.89885	696291.75803	Gunderson	Gunderson box	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
321	7634377.47868	696178.54930	Gunderson	Gunderson box	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
322	7634675.19227	696273.56325	Gunderson	Gunderson box	X	1	0	1	1	0	1	0	0	0	0 SVOCs, metals, PCBs, TBT	N
323	7634546.91908	696053.40642	Gunderson	Gunderson box	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
324	7634734.32597	695939.38570	Gunderson	Gunderson box	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
325	7634831.21250	696035.21164	Gunderson	Gunderson box	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
326	7634959.48569	696255.36847	Gunderson	Gunderson box	X	1	0	1	1	0	1	0	0	0	0 SVOCs, metals, PCBs, TBT	N
327	7635115.50592	696017.01686	Gunderson	Gunderson box	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
329	7635241.15617	695869.77520	Gunderson	Gunderson box	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
330	7635243.02317	695707.81458	Gunderson	Gunderson box	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
331	7635372.09559	695624.29713	Gunderson	Gunderson box	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
332	7635399.79935	695998.82209	Gunderson	Gunderson box	X	1	0	1	1	0	1	0	0	0	0 SVOCs, metals, PCBs, TBT	N
333	7631398.60497	700172.84347	Portland Shipyard	PSY-downstream	X	1	0	1	1	0	1	0	0	0	0 SVOCs, metals, PCBs, TBT	N
334	7628869.28812	702007.25136	Atofina	Transect 3- Channel	X	1	0	0	1	1	0	0	0	0	1 SVOCs, metals, pesticides, hexavalent chromium	N
335	7629161.70949	702293.58062	Atofina	Transect 3- Channel	X	1	0	0	1	1	0	0	0	0	1 SVOCs, metals, pesticides, hexavalent chromium	N
337	7632724.92415	700799.44546	Portland Shipyard	PSY-downstream	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
339	7632340.54687	700479.13107	Portland Shipyard	PSY-downstream	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
341	7633062.08000	700903.08000	Portland Shipyard	PSY-downstream	X	1	0	1	1	1	1	0	0	0	0 SVOCs, metals, PCBs, TBT, Pest	Y
342	7617333.76328	723858.00013	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs	Y
343	7617327.39990	723915.20933	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs	Y
344	7620244.39136	709964.44682	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs	Y
345	7620180.32496	710029.49578	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs	Y
346	7622242.98296	708474.66538	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs	Y
347	7621602.08596	707639.86959	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs	Y
348	7622071.06799	707077.28446	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs	Y
349	7625892.85357	704517.31884	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs	Y
350	7624835.69568	705150.50985	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	0 SVOCs, metals, Pest, PCBs	Y

ID	X	Y	SITE_NAME	LOCATION	DEPTH	SVOC	VOCS	TBT	METALS	PEST	PCB	DIOXFUR	CHLORHERB	HEXCHROM	ANALYTES	BENTHIC
351	7626973.30483	703406.25386	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs	Y
352	7627205.91257	703213.96479	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs	Y
353	7627512.95478	702916.22688	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs	Y
354	7627880.17344	702473.71844	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs	Y
355	7627802.48907	702597.59351	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs	Y
356	7628515.77407	701690.46799	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs	Y
357	7628233.63501	702103.55428	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs	Y
358	7627344.83477	705467.34295	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs	Y
359	7627269.49871	705260.24352	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs	Y
360	7627166.29590	705314.42767	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs	Y
361	7632899.52579	700580.46617	Benthic Samples	lwq location		1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs	Y
362	7632210.09540	700245.23855	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs	Y
363	7631489.03976	700751.24251	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs	Y
364	7632600.53101	701177.65506	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs	Y
365	7632909.55526	701900.45753	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs	Y
366	7635101.99206	699821.43666	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs	Y
367	7636004.42041	699452.26143	Benthic Samples	benthic located added		1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs	Y
368	7637261.45221	693883.48980	Benthic Samples	stormwater		1	0	0	1	1	1	0	0	0	SVOCs, metals, Pest, PCBs	Y

PORTLAND HARBOR: EPA ROUND 2 SEDIMENT CHEMISTRY AND TOXICITY SAMPLING PLAN



River Miles 2-3

Oregon Steel Mills

Surface and Subsurface Sediment Samples

Surface Sediment

- + Sediment Chemistry and Bioassay
- + Sediment Chemistry Only

Surface & Subsurface Sediment

- + Sediment Chemistry and Surface Bioassay
- + Sediment Chemistry Only

LWG: RI/FS 2A Field Sampling Plan

- Nature and Extent/Bioassay
- + Nature and Extent

- + Private Outfalls
- + City Outfalls
- River Miles (RM)
- Bridges
- Dock Structures
- COE Navigation Channel
- Near-Shore (-20 ft.) Grid Cells
- Main Channel
- Waterfront Taxlots



RM 2

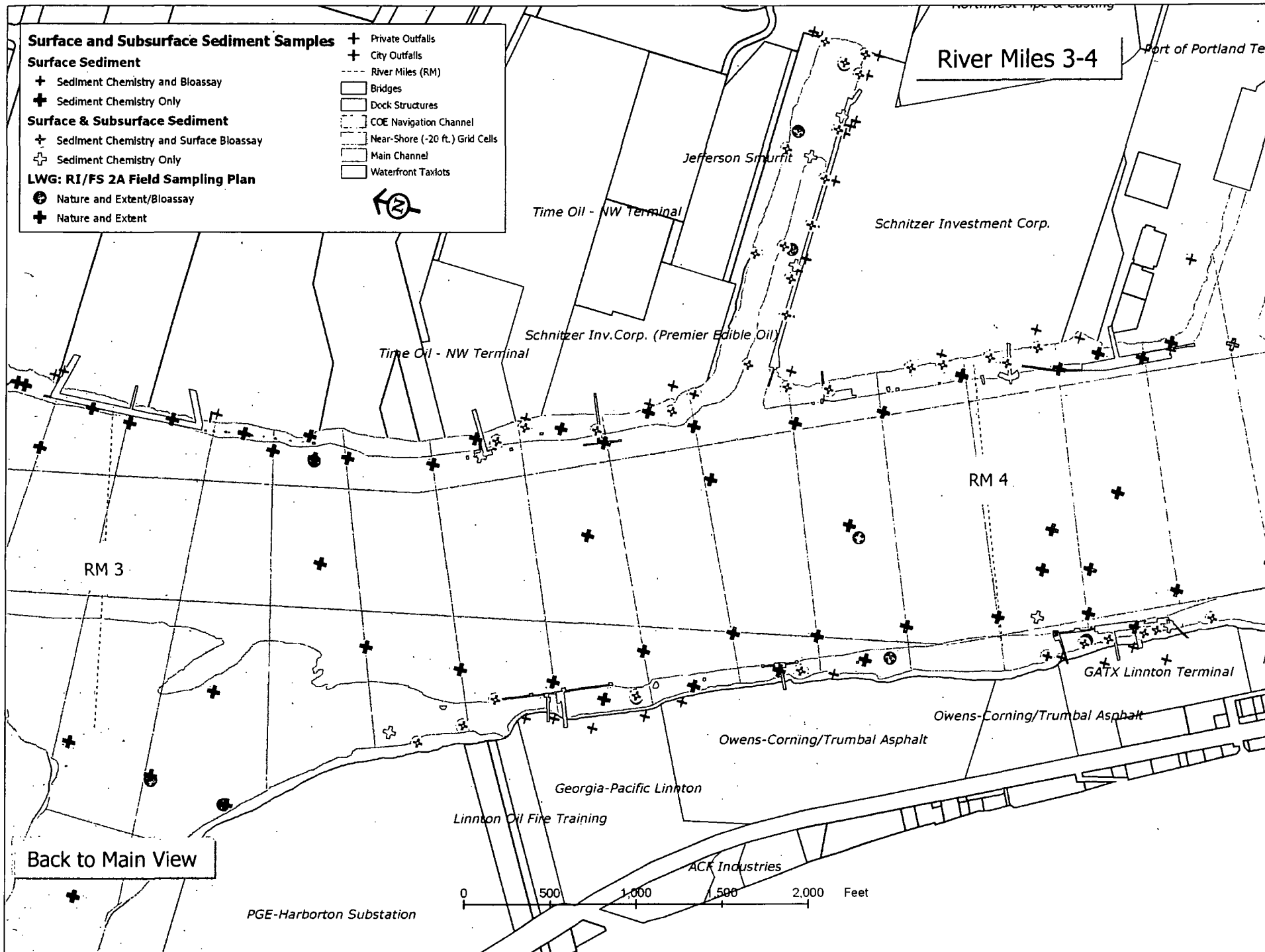
RM 3

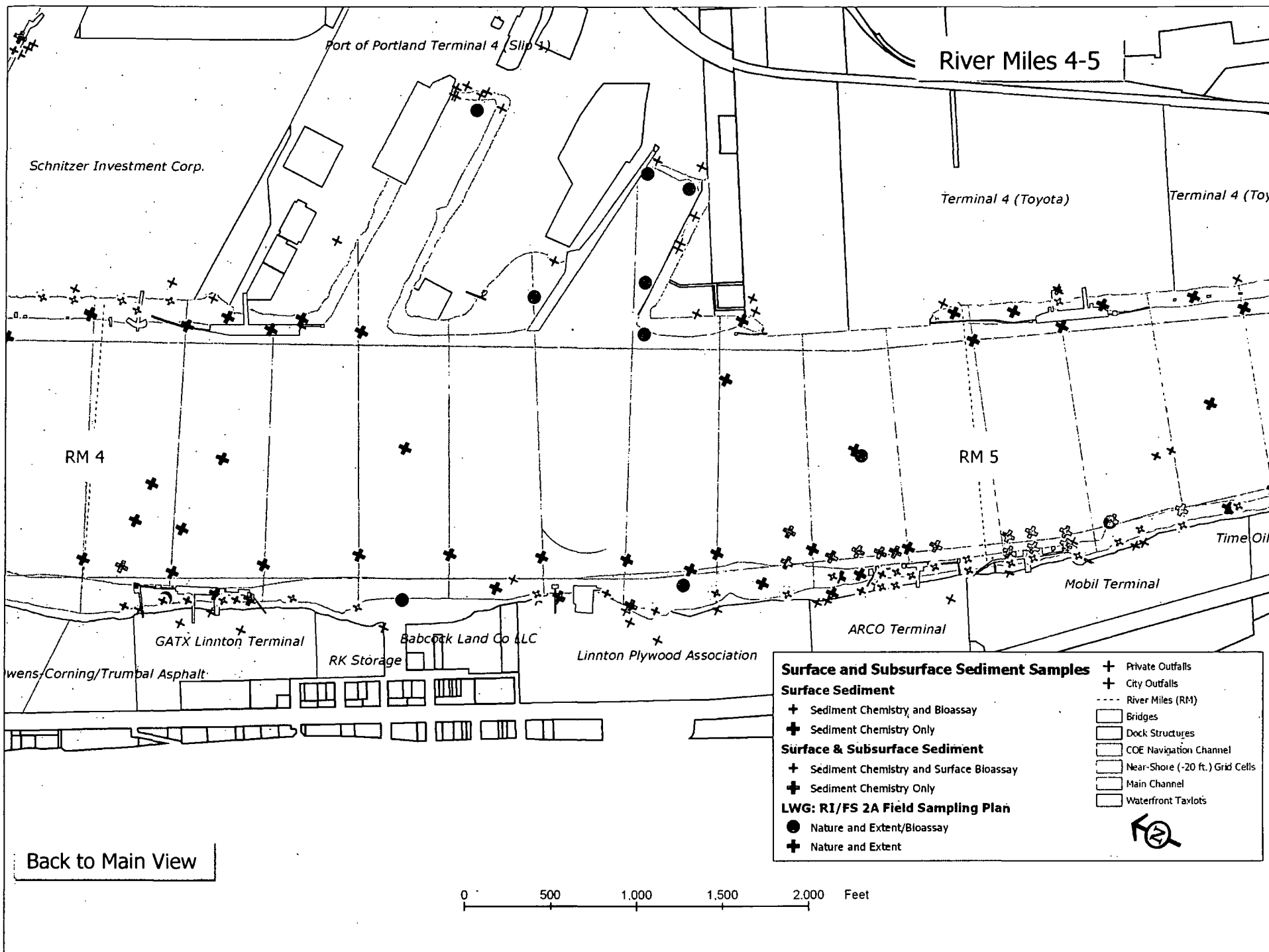
Back to Main View

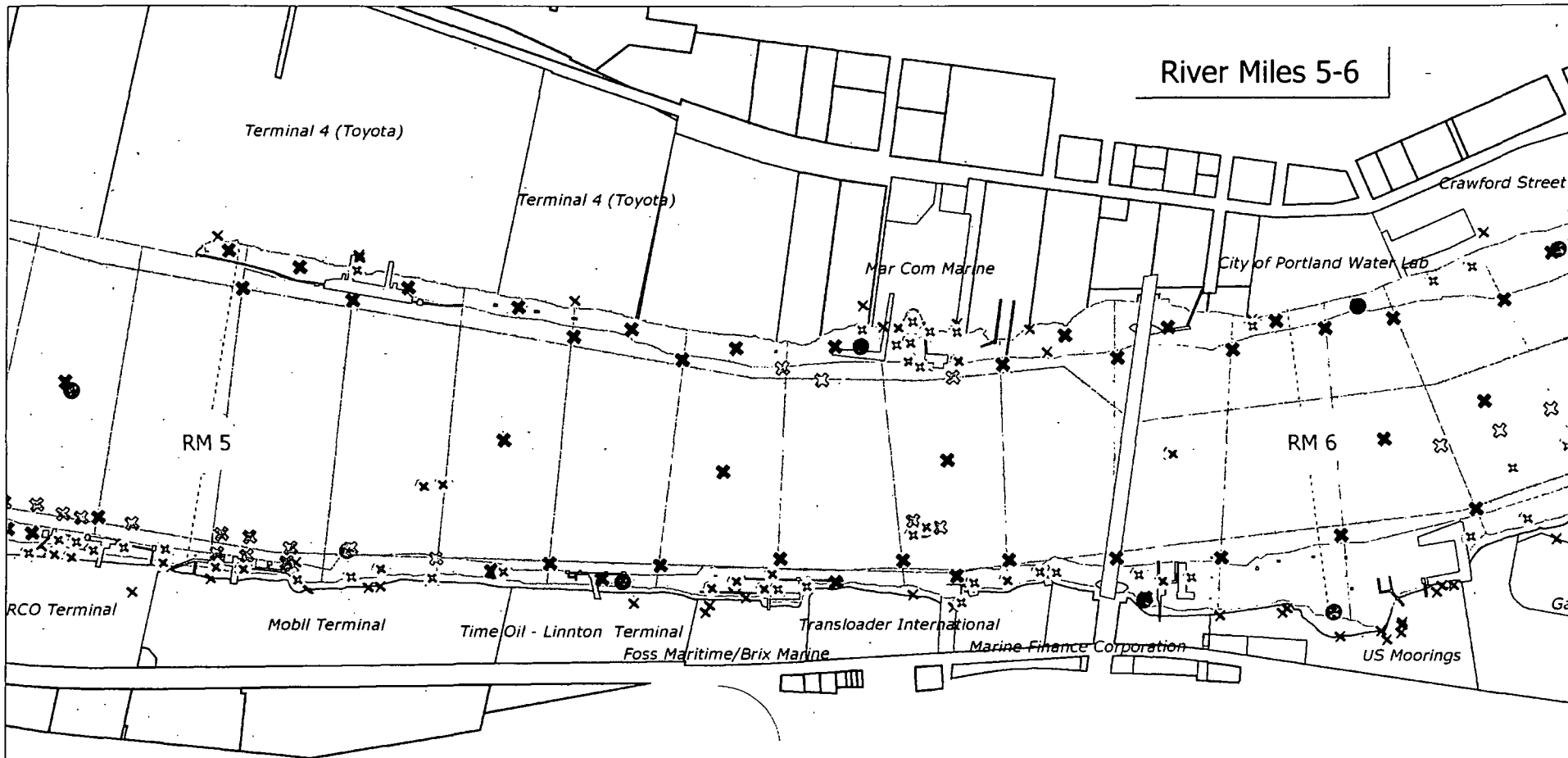
0 500 1,000 1,500 2,000 Feet

Alder Creek Lumber

BGF-Harborfront S







Surface and Subsurface Sediment Samples

Surface Sediment

- + Sediment Chemistry and Bioassay
- + Sediment Chemistry Only

Surface & Subsurface Sediment

- + Sediment Chemistry and Surface Bioassay
- + Sediment Chemistry Only

LWG: RI/FS 2A Field Sampling Plan

- Nature and Extent/Bioassay
- + Nature and Extent

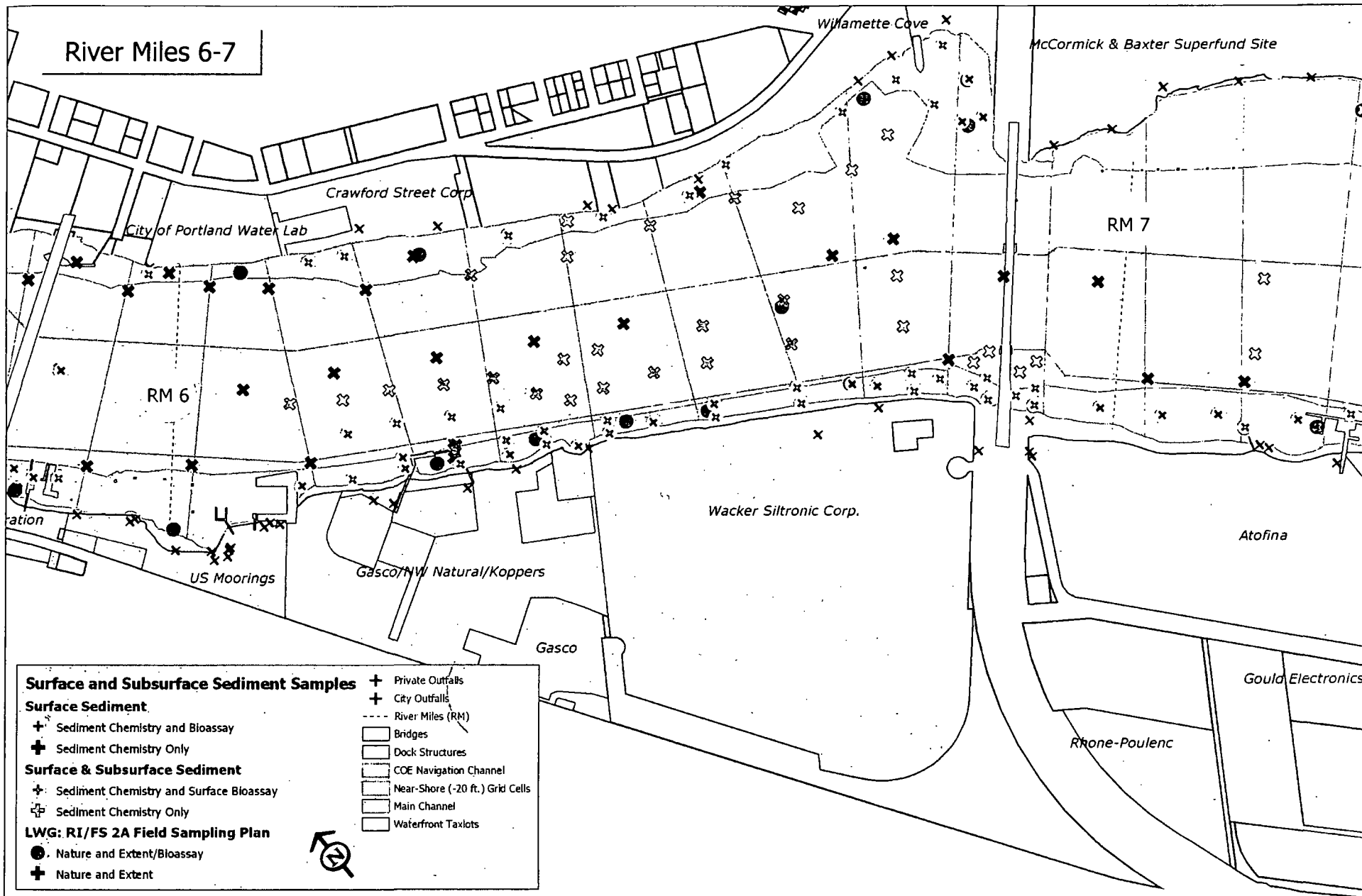
- + Private Outfalls
- + City Outfalls
- River Miles (RM)
- Bridges
- Dock Structures
- COE Navigation Channel
- Near-Shore (-20 ft.) Grid Cells
- Main Channel
- Waterfront Taxlots



[Back to Main View](#)

0 500 1,000 1,500 2,000 Feet

River Miles 6-7



Back to Main View

0 500 1,000 1,500 2,000 Feet

Surface and Subsurface Sediment Samples

Surface Sediment

- + Sediment Chemistry and Bioassay
- + Sediment Chemistry Only

Surface & Subsurface Sediment

- + Sediment Chemistry and Surface Bioassay
- + Sediment Chemistry Only

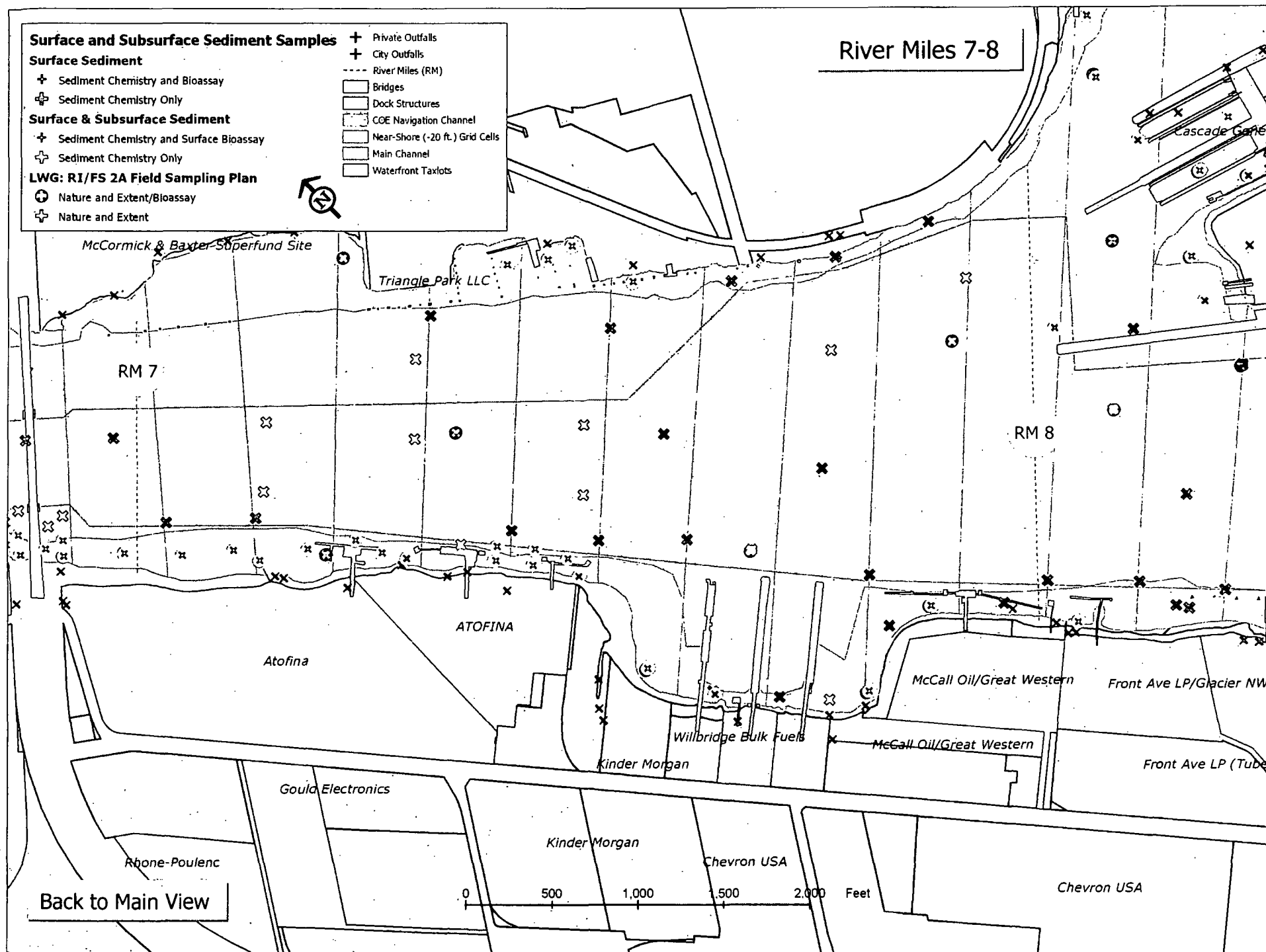
SWG: R1/FS 2A Field Sampling Plan

- + Nature and Extent/Bioassay
- + Nature and Extent

- + Private Outfalls
- + City Outfalls
- River Miles (RM)
- Bridges
- Dock Structures
- COE Navigation Channel
- Near-Shore (~20 ft.) Grid Cells
- Main Channel
- Waterfront Taxlots

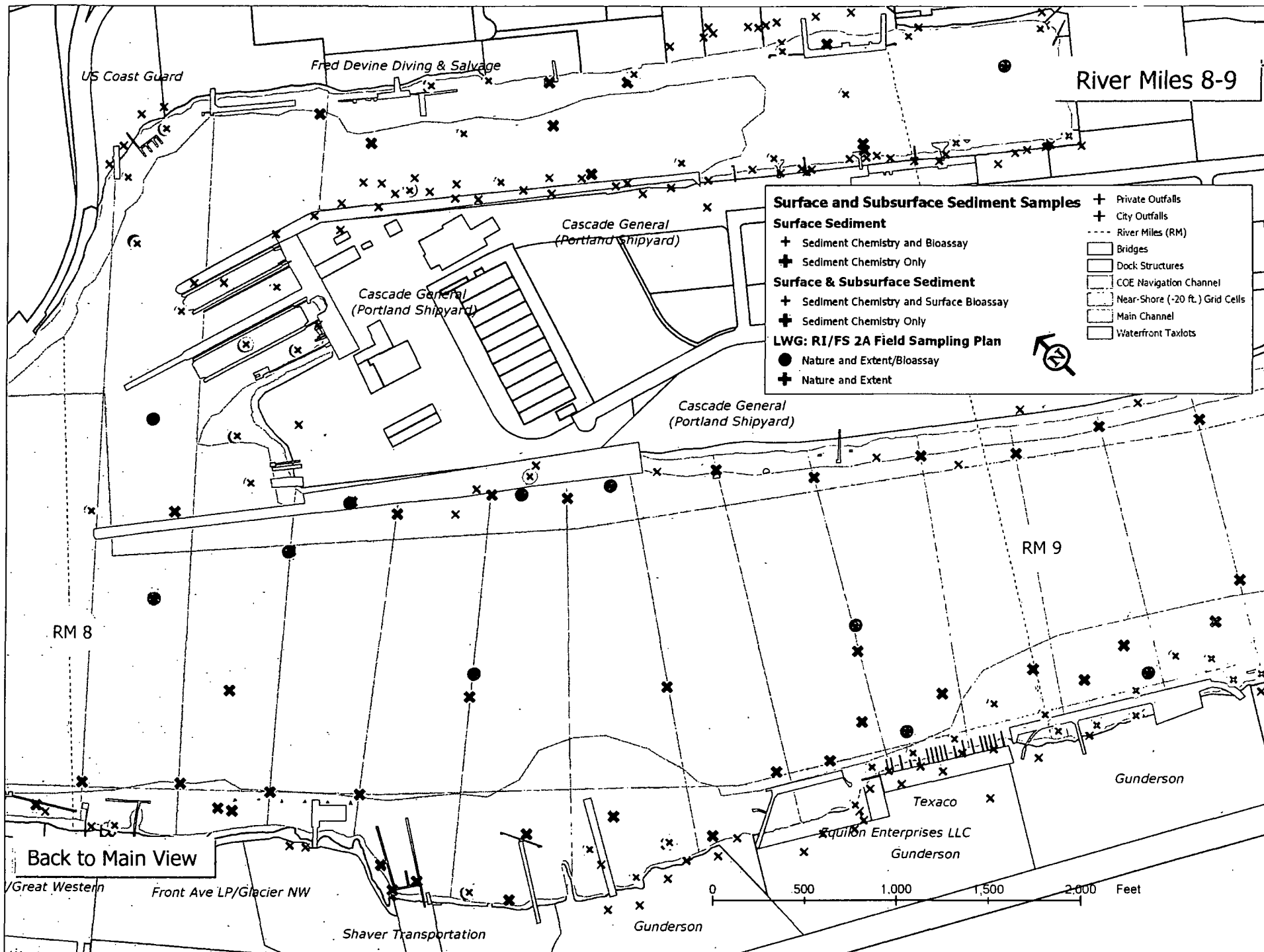


River Miles 7-8



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0 500 1,000 1,500 2,000 Feet



River Miles 9-10

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Surface and Subsurface Sediment Samples

Surface Sediment

- + Sediment Chemistry and Bioassay
- + Sediment Chemistry Only

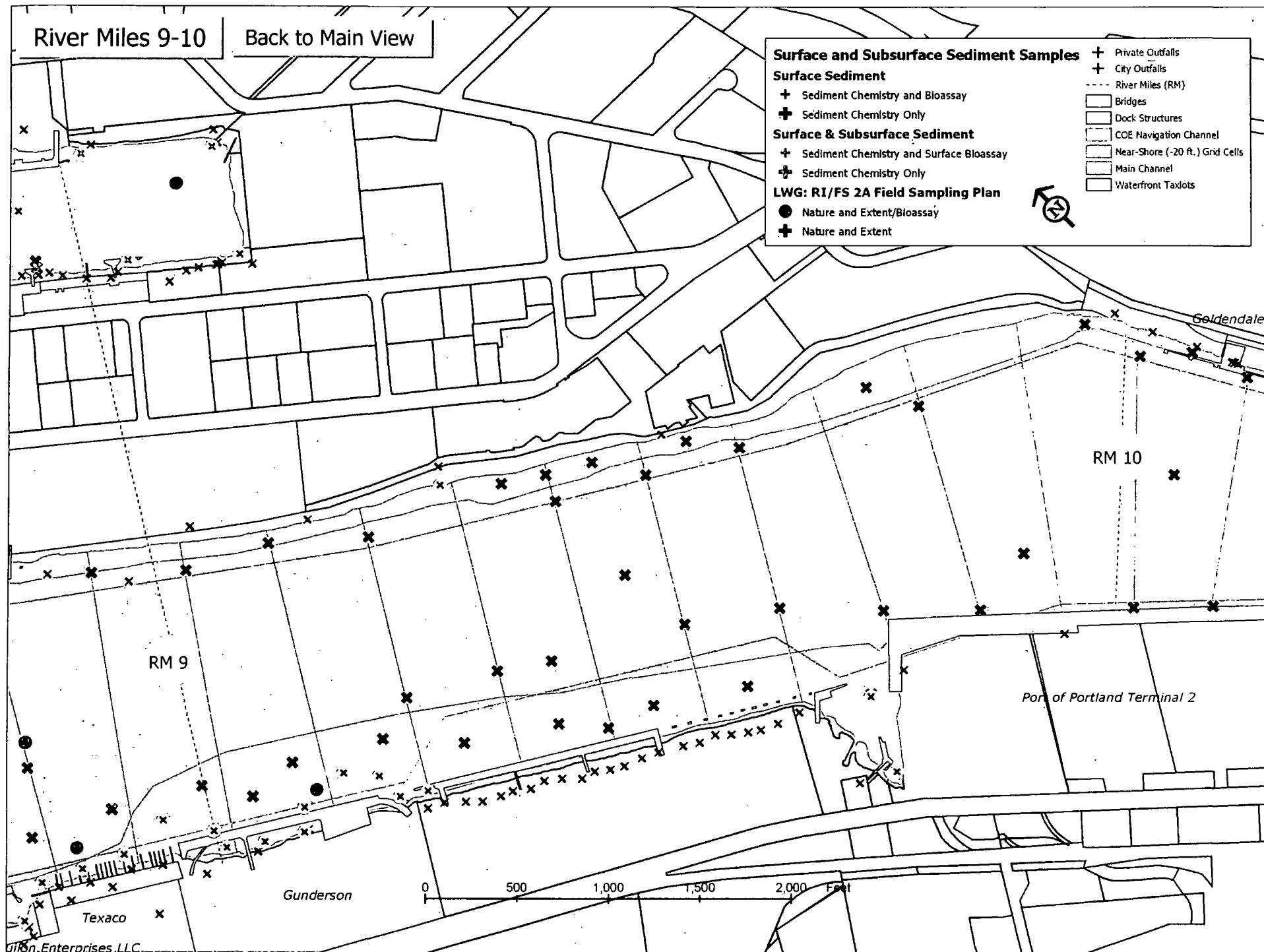
Surface & Subsurface Sediment

- + Sediment Chemistry and Surface Bioassay
- + Sediment Chemistry Only

SWG: RI/FS 2A Field Sampling Plan

- Nature and Extent/Bioassay
- + Nature and Extent

- + Private Outfalls
- + City Outfalls
- River Miles (RM)
- Bridges
- Dock Structures
- COE Navigation Channel
- Near-Shore (<20 ft.) Grid Cells
- Main Channel
- Waterfront Taxlots



River Miles 10-11

Surface and Subsurface Sediment Samples

Surface Sediment

- + Sediment Chemistry and Bioassay
- + Sediment Chemistry Only

Surface & Subsurface Sediment

- + Sediment Chemistry and Surface Bioassay
- + Sediment Chemistry Only

SWG: RI/FS 2A Field Sampling Plan

- Nature and Extent/Bioassay
- + Nature and Extent

- + Private Outfalls
- + City Outfalls
- River Miles (RM)
- Bridges
- Dock Structures
- COE Navigation Channel
- Near-Shore (~20 ft.) Grid Cells
- Main Channel
- Waterfront Taxlots



Goldendale Aluminum

UPRR Albina

RM 10

RM 11

Port of Portland Terminal 2

Terminal 1 North

Terminal 1 South

Back to Main View

0 500 1,000 1,500 2,000 Feet